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THE GENUS ALANGIUM IN THE NETHERLANDS INDIES

by

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The present revision comprises, besides the *Alangia* of the Netherlands Indies proper, also those of the Malay Peninsula, North Borneo, and Eastern New Guinea. The materials examined were kindly put at the author's disposal by the Directions of the following herbaria:

B = the Herbarium of the Botanic Garden, Buitenzorg.
BD = the Herbarium of the Botanic Garden, Berlin—Dahlem.
BM = the Herbarium of the British Museum of Natural History, London.
Br = the Herbarium of the Botanic Garden, Brisbane.
E = the Herbarium of the Botanic Garden, Edinburgh.
G = the Herbarium of the University, Groningen.
K = the Herbarium of the Botanic Garden, Kew.
L = the National Herbarium (Rijksherbarium), Leiden.
M = the Herbarium of the Bureau of Science, Manila.
NY = the Herbarium of the Botanic Garden, New York.
S = the Herbarium of the Botanic Garden, Singapore.
Sa = the Herbarium of the Sarawak Museum, Kuching.
U = the Herbarium of the University, Utrecht.
UC = the Herbarium of the University of California, Berkeley.
W = the Herbarium of the Museum of Natural History, Vienna.

Most of the materials were sent to Groningen to be studied there. Moreover, the author had the opportunity to visit the Herbaria of the Botanic Gardens at Kew, that of the British Museum of Natural History at London, and those of LINNAEUS and SMITH preserved among the collections of the Linnean Society at London.

To the Directions of all these Institutes and the Keepers of the Herbaria the author is very thankful for their kind assistance.

Alangium.

Flowers hermaphrodite; calyx tube connate with the ovary, calyx limb free, with 4—10 teeth; petals 4—10, loriformous, valvate, alternating with the calyx-teeth; stamens either isomerous, alternating with the petals and placed in one whorl, or more, placed in one or more whorls, usually nearly as long as the corolla; anthers linear, with loculi opening laterally and somewhat introrsely; pollen-grains globose; style single, usually nearly as long as the corolla, rarely distinctly shorter; disc intrastaminal, well-developed; ovary 1—2-celled, with one hanging anatropous ovule in each cell, the micropyle directed parallel to the dissepiment, in 2 cells of the same ovary looking in opposite directions. Fruit drupaceous, globose, ellipsoidal or oviformous, often more or less flattened (in the herbarium often strongly flattened and with longitudinal grooves and ribs), crowned by the persistent calyx limb and disc; mesocarp carnose or spongeous; endocarp hard, 1—2-celled with one seed in each cell or with one cell abortive; spermoderm chartaceous or thin-coriaceous; endosperm smooth or slightly grooved; cotyledons foliaceous, flat, palminervous at the base; radicle straight.

Usually trees, more rarely shrubs or woody climbers, the same species sometimes showing different modes of growth. Twigs terete, probably growing nearly horizontally for the greater part in the living state, or even hanging, often slightly dorsiventral. Leaves always alternate (distichous), simple, entire or more rarely lobed or with a small number of large teeth, without stipules; petiole terete or slightly grooved or flattened above, often with articulations at the base and the apex, especially in suckers. Inflorescences axillary, corymbose, all of its branches terminating in flowers. Flowering in the dry season, fruiting in the last part of the dry season and often in the following wet season.

Kara-Angolam & *Angolam* ADANSON, Fam., 2, p. 84 (1763) nomina reicienda; *Angolamia* SCOPOLI, Introd., p. 107 (1777) nom. reic.; *Alangium* LAMARCK, Encycl. méth., bot., 1, p. 174 (1783) nom. conserv.; MIQUEL, Fl. Ind. Bat., I, 1, p. 773 (1856); BENTH. & HOOK.F., Gen. pl., 1, p. 949 (1867); CLARKE, in HOOK.F., Fl. Br. Ind., 2, p. 741 (1879); BOERL., Handl. Fl. Ned. Ind., I, 2, p. 652 (1890); HARMS, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 260 (1898); KOORD. & VALETON, Bijdr. Booms. Java, 5, p. 66 (1900); WANGERIN, in ENGL., Pflanzenr., IV, 220*b*, p. 6 (1910); RIDL., Fl. Mal. Pen., 1, p. 892 (1922); *Stylidium* LOUREIRO, Fl. cochinch., 1, p. 220 (1790); *Stelanthes* STOKES, Bot. mat. med., 2, p. 339 (1812); *Marlea* ROXB., Hort. beng., p. 28 (1814) nom. nud.; Pl. corom., 3, p. 80, t. 283 (1819); MIQUEL, Fl. Ind. Bat., I, 1, p. 774 (1856); BENTH. & HOOK.F., Gen. pl., 1, p. 949 (1867); CLARKE, in HOOK.F., Fl. Br. Ind., 2, p. 742 (1879); BOERL., Handl. Fl. Ned. Ind., I, 2, p. 653 (1890); KOORD. & VALETON, Bijdr. Booms. Java, 5, p. 70 (1900); *Pautsavia* JUSS., in Mém. Mus. Par., 3, p. 443 (1817); *Stylis*

POIRET, in LAM., Encycl. méth., suppl., 5, p. 260 (1817); *Diacicarpium* BLUME, Bijdr., 13, p. 657 (1825); *Rhytidandra* A. GRAY, in Un. St. Expl. Exped., Bot., 1, p. 302, t. 28 (1854); *Pseudalangium,* F. v. MUELL., Fragm. Phyt. Austr., 2, p. 84 (1860); *Karangolum* KUNTZE, Rev. gen. pl., 1, p. 272 (1891).

About the polymorphy of the genus, especially about the differences that are important for the distinction and the arrangement of the species, the following remarks may be given.

The stems of different species show, in the main, three modes of growth and ramification.

1. The twigs are monopodia, as, at the beginning of each vegetation period, they continue their growth from the terminal bud. In the flowering plant, the ramification takes place by the inflorescences bearing a terminal leaf-bud growing out to a twig later. This we find in *A. salvifolium* ssp. *hexapetalum,* and probably in *A. longiflorum* and *A. hirsutum.*

2. The twigs are sympodia, as the terminal bud of each vegetation period dies and, at the beginning of the following vegetation period, the twig continues its growth from the uppermost axil. The ramification of the twig takes place from the 2 or 3 preceding axils of the same twig. This case we find in *A. chinense, A. rotundifolium* and *A. Kurzii.*

N.B. In *A. nobile* the twigs probably are monopodia, whereas the ramification takes place from few upper axils of the former vegetation period.

3. The twigs are monopodia, continuing their growth, at the beginning of each vegetation period, from the terminal bud. The ramifications, however, originate from the axils of the young leaves of the last vegetation period; each of these ramifications is nearly as strong as the adjacent part of the main twig, this almost causing pseudodichotomy. By this early development of axillary branches the position of the leaves is highly influenced in such a way, that their insertions turn downward; in herbarium specimens, the leaf really bearing a branch in its axil often appears to be placed in the fork between the twig and its branch. Very distinctly we see this in *A. Griffithii, A. villosum* and *A. Warburgianum,* less distinctly in *A. scandens, A. Havilandii, A. Ridleyi* and *A. javanicum.* The latter probably is caused by the later development of the ramifications.

The nervation of the leaves is a valuable character for the distinction of species, but for the natural arrangement of the species it is of little importance. The main nervation varies from purely pennate to purely palmate, with all kinds of intermediary stages. Real secundary nerves are, in general, restricted to the marginal zone and the basal lobes of cordate leaves, especially in such cases as that of *A. nobile,* where the leaves are at the same time strongly nerved and deeple cordate. Much more peculiar are the arcuate veins, formed by slightly thickened portions of the reticulate venation. The more roundish the lamina, the more arcuate these veins; the more oblong the lamina, the more transverse these veins. (Cfr. Fig. 1*a*, 2*d*, 3*a*, 4*a*, 5*a*.)

The more or less developed asymmetry of the lamina has no greater importance. This asymmetry varies from very strong to nearly none; always the largest side of the lamina is turned towards the tip of the twig.

More important for the natural arrangement of the species is the structure of the inflorescence. This structure is between racemose and cymose. In outline the inflorescence is corymbose; each time that it is branched the number of branches is small and all branches are terminated by a flower. But the branches are not always inserted at the same height, and between them and the terminal flowers there are often 1 or 2 smaller, sterile bracts.

There may be distinguished three main types among them.

1. The first type of inflorescence is sessile or more rarely shortly peduncled; the branches, including the pedicels, are distinctly developed; the sterile bracts as well as the fertile ones are well-developed, and the sterile ones often are removed upward to the bases of the flowers. Instead of the terminal flower of the main axis there is a leaf-bud from which, at the beginning of the next vegetation period, a twig takes its origin. This type of inflorescence we find in *A. salvifolium* ssp. *hexapetalum, A. hirsutum* and *A. longiflorum.* (Cfr. fig. 1*a*.)

2. In the second type of inflorescence the peduncle is always distinct and often rather long, as are the branches and even the pedicels; bracts are often absent and where there occur two branches at the same height there is never more than one bract, and this is turned towards the earth. The smaller sterile bracts are lacking or there is one, or rarely 2, and they are often removed to the bases of the flowers. This type of inflorescence we find in *A. chinense, A. Kurzii, A. rotundifolium, A. scandens, A. Griffithii, A. villosum, A. Warburgianum* and *A. ferrugineum.* (Cfr. fig. 2*d* and 3*a*.)

3. The third type of inflorescence is either sessile with few long primary branches and short secundary and further branches and pedicels, or there is only one main branch so that the inflorescence is rather

long-peduncled. This type of inflorescence occurs in *A. nobile, A. Havilandii, A. Ridleyi* and *A. javanicum.* Bracts are lacking or rare (as in the second type), in *A. nobile* and *A. Havilandii,* or they are well-developed and then often removed to the bases of the flowers, in *A. Ridleyi* and *A. javanicum.* (Cfr. fig. 4*a* and 5*a.*)

The number of stamens is usually the same as that of the petals and calyx teeth; in a small number of species, however, the number of petals is 2—5 × that of the petals and calyx teeth. Among the species occurring in the area dealt with in this publication, *A. salvifolium* ssp. *hexapetalum, A. longiflorum* and *A. hirsutum* belong to this group.

For the distinction of species the form of the filament is rather important. Sometimes the filament can be divided into a thicker or broader lower, and a thinner or narrower upper portion, and in that case the lower portion can even be prolongated before the base of the upper portion and can be hairy in a different way. This difference between a lower and an upper portion is distinct in *A. salvifolium* ssp. *hexapetalum, A nobile, A. Havilandii* and *A. Griffithii* (cfr. fig. 1*c*, 2*m*, 4*c*, 4*f*, 4*h*), less distinct and moreover variable in *A. chinense, A. rotundifolium, A. scandens, A. Kurzii, A. villosum* and *A. ferrugineum.* In the other species it is absent (cfr. fig. 1*f*, 3*l*, 5*c*, 5*k-q*, 5*y-aa*).

Among the floral organs also the form of the style and the stigma is of great importance for the distinction and the arrangement of the species. A part of the species have a rather cylindrical style and a capitate stigma, that is shortly 4-lobed with crenate or superficially divided lobes. This is the case in *A. salvifolium* ssp. *hexapetalum, A. longiflorum, A. hirsutum, A. chinense, A. rotundifolium, A. Kurzii, A. scandens* and *A. Griffithii.* (Cfr. fig. 1*b*, 1*d*, 2*g*.) Another part has a style slightly thickened from the base to the tip, and a stigma deeply split into 2 long and narrow lobes, that are entire and stigmatose at the inside. To this group belong *A. villosum, A. ferrugineum* and *A. Warburgianum.* (Cfr. fig. 3*b*, 3*k*.) A third part have a style thin at the base and gradually thickened towards the apex, and a stigma that is obtuse-conical and with 4 longitudinal stigmatose stripes. This is the case in *A. nobile, A. Havilandii, A. Ridleyi* and *A. javanicum.* (Cfr. fig. 4*b*, 4*g*, 5*b*.)

Of little importance is the fact, that the calyx tube may be grooved or smooth. In general the calyx tube is more or less grooved in *A. salvifolium* ssp. *hexapetalum, A. longiflorum* and *A. hirsutum,* and smooth in all other species, but aberrations from this rule are of no taxonomical value. The number of grooves, if present, is once or twice that of the calyx teeth.

The endosperm is slightly superficially grooved in *A. salvifolium* ssp. *hexapetalum, A. longiflorum* and *A. hirsutum,* smooth in all other species.

In this paper there have been distinguished, in the genus *Alangium,* 4 sections, 15 species, and in one species 2 subspecies, in 3 others a number of varieties.

It would have been possible to elevate the sections to the rank of genera. In that case we would have got, instead of one sharply limited genus, a number of much less sharply limited smaller ones, of which some even would appear somewhat artificial, and all of them would comprise rather few species. This practice appeared undesirable.

In delimiting the species, the large European (Linnean) species were taken as an example, not the small species of the Austrian botanists (Kerner, Wettstein, and followers). The large Linnean species appear to coincide more or less with the intercrossing communities of which all members may give fertile hybrids (commiscua of Danser). The small species of the Austrian botanists often are natural subdivisions of the large species. In those cases in which they appear to be distinct geographical variations, they might be distinguished as subspecies. This is certainly the case in *Alangium salvifolium* ssp. *decapetalum* and ssp. *hexapetalum,* perhaps also in the forms united under *Alangium villosum.* Such subspecies seem to be species on first sight, but they are connected by intermediary forms.

Under the name of varieties are taken together all variations of a species. Also the subspecies distinguished are varieties, but not all varieties are subspecies. In *Alangium villosum* there have been distinguished varieties that very probably deserve the rank of subspecies. In other cases, as in *A. nobile* and *A. javanicum* the systematic value of the varieties distinguished could not be stated, but they looked too important to be passed by in silence. They may as well appear to be new species as subspecies or only local forms of little taxonomical importance.

First key to the species, for flower-bearing materials.

1 Stigma broader than long, or sometimes as broad as long, capitate or semiglobose, 4-lobed, with crenate lobes 2
Stigma longer than broad, obtuse-conical, with 4 longitudinal stigmatose stripes 11
Stigma deeply split into 2 long and narrow lobes 9

2 Stamens 2—6 × as many as petals 3
Stamens as many as petals 5
3 Flowers 14—23 mm long. Anthers longer than the filaments. Inflorescences 7—17-flowered. Malay Peninsula and whole Malay Archipelago except Borneo **1. A. salvifolium ssp. hexapetalum**, p. 250
Flowers 25—50 mm long. Anthers shorter than the filaments. Inflorescences 1—5-flowered 4
4 Flowers 35—50 mm long. Young twigs and inflorescences and nerves of the leaves below tomentose. Borneo **2. A. longiflorum**, p. 253
Flowers nearly 25 mm long. Young twigs, inflorescences and nerves of the leaves below hirsute-tomentose or hirsute. Borneo, Sumatra? **3. A. hirsutum**, p. 254
5 Leaves palminervous at the base. Connective glabrous or hairy . . 6
Leaves entirely penninervous. Connective hairy. Sumatra, Borneo . . **7. A. scandens**, p. 264
6 Both style and connective glabrous. Pedicels 0—2 mm long. Inflorescences 6—60-flowered. Sumatra to Moluccas and Malay Peninsula **8. A. Griffithii**, p. 266
Either style or connective hairy. Pedicels 5—21 mm long. Inflorescences 3—25-flowered 7
7 Style hairy, connective glabrous. Java, Lesser Sunda Islands . . . **4. A. chinense**, p. 255
Style glabrous, connective hairy 8
8 Lamina roundish to ovate or triangular-ovate, often lobate or with few large teeth, glabrous below or shortly hirsute-tomentose on the nerves, never entirely tomentose. Flowers 7.5—24 mm long. Malay Peninsula, Sumatra, Borneo, Java, Bali **5. A. rotundifolium**, p. 258
Lamina usually triangular-ovate, rarely more roundish or more oblong, never lobate nor dentate, entirely soft-tomentose below. Flowers 19—31 mm long. Malay Peninsula, Sumatra, Java . . . . **6. A. Kurzii**, p. 262
9 Calyx teeth lingulate, more than 1 mm long. Batjan Islands . . . **11. A. Warburgianum**, p. 273
Calyx teeth short-triangular, less than 1 mm long 10
10 Flowers at most 12 mm long. Java, Flores . . **9. A. villosum**, p. 269
Flowers 15—16 (—22?) mm long. New Guinea . . . . **10. A. ferrugineum**, p. 272
11 Filament composed of a dilate lower and a narrower upper portion. Leaves either entirely penninervous or palminervous at the base . 12
Filament not composed of two different portions. Leaves entirely penninervous 13
12 Leaves palminervous at the base. Calyx teeth 1—3.5 mm long. Indumentum hirsute-tomentose. Malay Peninsula, Sumatra, Borneo **12. A. nobile**, p. 275
Leaves entirely penninervous. Calyx teeth nearly 0.75 mm long. Indumentum very densely thin-tomentose. Borneo . . . . . . **13. A. Havilandii**, p. 277
13 Twigs between the adult leaves 3—9 mm thick. Flowers 18—27 mm

long. Corolla in bud 4—7 mm thick, in herbarium specimens angular. Malay Peninsula, Sumatra . . . . . **14. A. Ridleyi,** p. 278

Twigs between the adult leaves 1.5—6.5 mm thick. Flowers 8—25 mm long. Corolla in bud 1.75—5 mm thick, nearly terete in herbarium specimens . . . . **15. A. javanicum,** p. 281

The last 2 species can only be distinguished with certainty when fruits are present. Cfr. also *A. maliliense* added afterwards.

Second key to the species, for fruit-bearing materials.

A. Havilandii, the fruit of which is unknown, and *A. maliliense,* added afterwards, have not been inserted in this key.

1 Leaves palminervous or triplinervous at the base 2

Leaves entirely penninervous 9

2 Leaves triplinervous at the base, symmetrical or slightly asymmetrical 3

Leaves 3—11-plinervous at the base, usually strongly asymmetrical, if nearly symmetrical never triplinervous 5

3 Leaves glabrous or sparingly hairy on the nerves beneath near the base. Fruit nearly globose, rarely ovate, with rounded base and apex, 9—18.5 mm long incl. the calyx limb. Malay Peninsula, nearly whole Malay Archipelago with exception of Borneo . . . . . . **1. A. salvifolium ssp. hexapetalum,** p. 250

Leaves hirsute or appressedly hairy on the petiole, the midrib above and the nerves and veins below. Fruit ellipsoid or ovate, 17—32.5 mm long 4

4 Leaves shortly appressedly hairy on the petiole, the midrib above and the nerves and veins below. Fruit rounded at the base and the apex, 17—20 mm long including the calyx. Borneo **2. A. longiflorum,** p. 253

Leaves more or less hirsute on the petiole, the midrib above, and the nerves and veins below. Fruit acute at the base and the apex, 28—32.5 mm long inclusive the calyx limb. Borneo, Sumatra? **3. A. hirsutum,** p. 254

5 Fruit 26—32 mm long incl. the calyx limb, thickly tomentose. Calyx lobes 2—3 mm long, connivent. Malay Peninsula, Sumatra, Borneo **12. A. nobile,** p. 275

Fruit 9—28 mm long incl. the calyx limb, glabrous or thin-tomentose. Calyx teeth hardly visible, not connivent 6

6 Leaves 3—5-plinervous at the base. Petiole 4—12 mm long. Lamina 2 or more times as long as broad. Fruit 12—18 mm long, incl. calyx limb, one-celled, compressed-oviformous. Disc as high as the calyx limb or only little higher. Sumatra to Moluccas incl. the Malay Peninsula . . . . **8. A. Griffithii,** p. 266

Leaves 4—9-plinervous at the base. Petiole 8—65 mm long. Lamina less than twice as long as broad, usually nearly as long as broad. Fruit 9—28 mm long, incl. calyx limb, one- or 2-celled, very rarely 3-celled, ovate or ellipsoid, compressed or not so. Disc usually swollen and distinctly higher than the calyx limb. 7

7 Fruit 17—28 mm long incl. calyx limb, usually one-celled or more rarely 2-celled with one abortive cell, rarely completely 2-celled. Leaves glabrous, sparingly short-hairy, or more or less hirsute-tomentose on the nerves below, but never entirely soft-tomentose below. Malay Peninsula, Sumatra, Borneo, Java, Bali 5. **A. rotundifolium**, p. 258

Fruit 9—14 mm long incl. the calyx limb, usually 2-celled. Leaves either nearly glabrous or entirely tomentose below 8

8 Leaves often dentate or lobate, wellnigh glabrous. Fruit 9—13 mm long incl. the calyx limb. Java, Lesser Sunda Islands . . . . 4. **A. chinense**, p. 255

Leaves never dentate nor lobate, entirely soft-tomentose below. Fruit 12—14 mm long incl. the calyx limb. Malay Peninsula, Sumatra, Java 6. **A. Kurzii**, p. 262

9 Fruit 8—18 mm long incl. calyx limb. Leaves glabrous or tomentose below 10

Fruit 17—37 mm long. Leaves glabrous, sparingly hairy or thin-tomentose on the nerves below 12

Fruit 30—32 (—35?) mm long, leaves soft-hairy with ferrugineous indumentum below. New Guinea . . 10. **A. ferrugineum**, p. 272

10 Disc higher than the calyx limb. Fruit ovate with rounded base, somewhat acuminate towards the apex, 11—13 mm long. Sumatra, Borneo 7. **A. scandens**, p. 264

Disc not higher than the calyx limb. Fruit not like this 11

11 Calyx teeth oblong, nearly 1.5 mm long, connivent. Fruit 17—18 mm long incl. calyx limb, ovate-ellipsoid, somewhat acute at the base. Batjan Islands . . . . 11. **A. Warburgianum**, p. 273

Calyx teeth much shorter, not connivent. Fruit 10—17 mm long incl. calyx limb, nearly globose or ellipsoid, rounded at the base and the apex. Java . . . . 9. **A. villosum**, p. 269

12 Fruit 27—37 mm long incl. calyx limb, 18—22 mm broad, 12—14 mm thick, strongly grooved and ribbed in the dry state with 10—14 obtuse ribs. Twigs between the adult leaves 3—9 mm thick. Malay Peninsula, Sumatra . . . . 14. **A. Ridleyi**, p. 278

Fruit 17—35 mm long, 11—17.5 mm broad, 6—12 mm thick, usually not or only slightly ribbed. Twigs between the adult leaves 1.5—6.5 mm thick. Malay Peninsula, and from Sumatra to New Guinea with exception of the Lesser Sunda Islands 15. **A. javanicum**, p. 281

Section I. *Stamens 2—5 × as many as petals and calyx teeth. Style cylindrical with capitate 4-lobed stigma. Endosperm shallow-grooved. Radicle at least 1.5 × as long as the cotyledons.* Species 1—3. **Fig. 1.** — Stems monopodial, branching from the axils of the former vegetation period, in flowering specimens from the terminal buds of the inflorescences. Leaves symmetrical, usually obovate-oblong, palminervous at the base. Inflorescences sessile or shortly peduncled, with distinct branches, pedicels, and bracts as well at the base of the branches as between these and the flowers. Style glabrous. Ovary one-celled. Fruit slightly, seed hardly flattened.

1. **Alangium salvifolium** (LINN.F.) WANGERIN **ssp. hexapetalum** (LAM.) WANGERIN — *Internodes* between the adult leaves 1.3—4.5 cm long, 1.5—5 mm thick, glabrescent. *Petiole* 5—15 mm long, glabrescent; lamina usually obovate-oblong to oblong, more rarely broader or narrower, symmetrical, 7.5—18.5 cm long, 3—9 cm broad, rounded to cuneate at the base, rather long- and abrupt-acuminate towards the usually obtuse apex, thin-coriaceous, glabrous or sparingly hairy on the nerves below, triplinervous at the base, moreover with 3—6 lateral nerves at each side of the midrib. *Inflorescence* shortly and densely hirsute-tomentose, sessile or nearly sessile, 2—3 × branched, 3—17-flowered, 12—23 mm long (flowers excluded); peduncle 2—4 mm long, pedicels 2—8 mm long; bracts triangular 0.5—3 mm long, 0.5—0.75 mm broad. *Flowers* 14.5—23 mm long; calyx shortly and densely hirsute-tomentose, the tube 0.75—1.75 mm long, the limb cupuliformous or spreading, 0.75—1.75 mm long, 2.5—4.25 mm wide, with teeth 0.25—0.5 mm long; corolla 5—7-, usually 5-merous, in the bud state nearly cylindrical 1.75—2.75 mm thick, swollen up to 4.5 mm thick in the

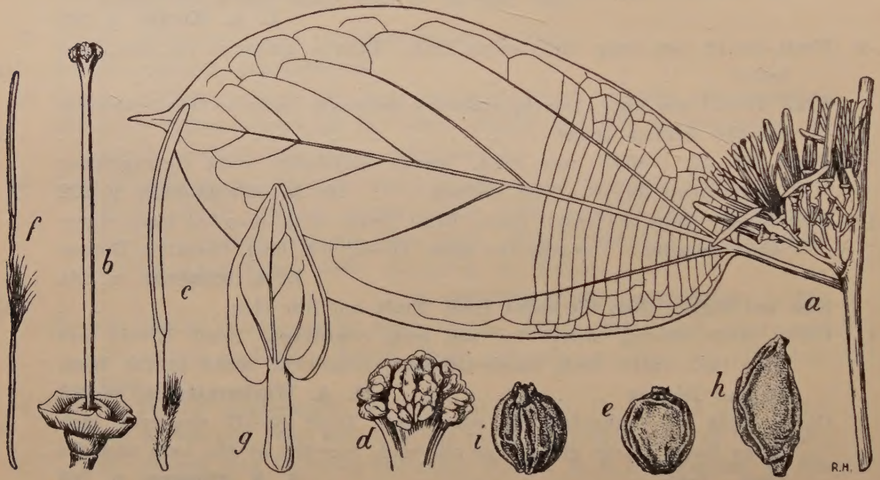

Fig. 1: *Alangium* sect. I. **a—e**: *A. salvifolium* ssp. *hexapetalum*; **a**: twig fragment with leaf and inflorescence, $^3/_5$ ×; **b**: calyx and pistill, $2^1/_2$ ×; **c**: stamen, $2^1/_2$ ×; **d**: stigma, $7^1/_2$ ×; **e**: fruit, $^3/_5$ ×; **f—h**: *A. hirsutum*; **f**: stamen, $2^1/_2$ ×; **g**: embryo, $2^1/_2$ ×; **h**: fruit, $^3/_5$ ×; **i**: *A. longiflorum*, fruit $^3/_5$ ×; **a, b, d,** after Bot. Gard. Buitenzorg XVII. C. 136, **c** after VAN STEENIS 909, **e** after TEYSMANN s.n. from P. Sebesi, **f, g, h** after HALLIER B. 3238, **i** after ELMER 16120.

basal part, slightly swollen in the apical portion, obtuse at the apex; petals 14—21 mm long, short-tomentose outside, shortly hairy inside above the dilate basal portion; stamens 10—18 in number, 12—18 mm long; filament 5—6 mm long, the basal part 4—5 mm long, 1—2.5 mm broad, thickened prolongated and bearded at the apex inside, pilose along the margin and outside, the upper portion 1—2.5 mm long, 0.75 mm broad, glabrous; anther 8—13 mm long, 0.75 mm broad, with glabrous connective; style glabrous, 11—18 mm long, 0.5—0.75 mm thick; stigma capitate, 1 mm long, 2.25 mm in diameter; disc 5—7-angular, 1.5 mm high, 4 mm in diameter; ovary one-celled. *Fruit* in the dry state globose to oviformous-globose, rounded at the base and the apex, 9—18.5 mm long (inclusive calyx and disc), 6.5—16 mm diam., short-tomentose to glabrous, sometimes with 10—14 obtuse ribs, crowned by the calyx limb 1 mm high, 4 mm wide and the disc as high as the calyx or little higher. (Description after the herbarium materials mentioned). **Cfr. fig. 1, a—e.**

According to the notes on herbarium labels *A. salvifolium* ssp. *hexapetalum* is mostly a climbing shrub up to 26 m high with a stem up to 10 cm thick, more rarely an erect shrub or a small tree up to 12 m high with a bole up to 30 cm thick; its leaves are glossy green, not deciduous in the dry season; its corolla is white or greenish-white, or green inside, rarely red, the stamens white, the fruit red when ripe. It occurs at an elevation of 10—1400 m above sea level.

Alangium hexapetalum Lamarck, Enc. méth., bot., 1, p. 175 (1783); D. C., Prodr., 3, p. 203 (1828); Miq., Fl. Ind. Bat., I, 1, p. 774 (1856); Teysm. & Binn., Cat. Pl. Hort. Bot. Bogor., p. 238 (1866); Gresh., Meded. 's Lands Plantent., 25, p. 89 (1898); Koorders, Exkursionsfl. Java. 2, p. 731 (1912); *Alangium frutescens* Zolling., Syst. Verz. 1842—1848, fasc. 3, p. 63 (1855); in Nat. Tijdschr. Ned. Ind., 14, p. 156 (1857) nomen; *Alangium Mohillae* Tul., Ann. Sc. Nat. ser. 4, 6, p. 105 (1856); Harms, in Engl. & Pr., Nat. Pflanzenfam., III, 8, p. 261 (1898); *Alangium glandulosum* Thwaites, Enum., p. 133 (1859); Trimen, Handb. Fl. Ceyl., 2, p. 286 (1894); *Alangium Lamarckii* Thwaites, Enum. Pl. Zeyl., p. 133 (1859) p. p.; Clarke, in Hook.f., Fl. Br. Ind., 2, p. 741 (1879) p. p. incl. var. *glandulosum*; Trimen, Handb. Fl. Ceyl., 2, p. 285 (1894) p.p.; King, Journ. As. Soc. Beng., 71, II, p. 76 (1902) cum var. *glandulosa*; Wangerin, in Engl., Jahrb., 38, Beibl. 86, p. 62—67 (1906) p.p.; Ridl., Fl. Mal. Pen., 1, p. 892 (1922); *Alangium sundanum* Miq., Fl. Ind. Bat., I, 1, p. 774 (1856); suppl. Sum., p. 136, 341 (1860) cum var. β; Teysm. & Binn., Cat. Pl. Hort. Bot. Bogor., p. 238 (1866); Kurz, For. Fl. Burma, 1, p. 543 (1877); Gresh., Meded. 's Lands Plantent., 25, p. 90 (1898) prob.; Koord. & Valet., Bijdr. Booms. Java, 5, p. 68 (1900); Jansson., in Moll & Janss., Mikrogr. 3, p. 695 (1918); *Karangolum Mohillae* Kuntze, Rev. gen. pl., 1, p. 273 (1891); *Alangium salvifolium* Koord.-Schum., Syst. Verz., 1, fam. 229, p. 103 (1912); Baker, in Journ. Bot., 62, suppl. p. 45 (1924) p.p.; Dakkus, in Bull. Jard. Bot. Buitenz., ser. 3, suppl. 1, p. 13 (1930); *Alangium salviifolium* ssp. *hexapetalum* Wangerin, in

ENGL., Pflanzenr., IV, 220b, p. 9, ic. 2F (1910) p.p.; KOORD., Exkursionsfl. Java, 2, p. 732 (1912); MELCHIOR & MANSF., in ENGL., Jahrb., 60, p. 163 (1925); DOCT. V. LEEUWEN, Zoocec., p. 438 (1926); VAN STEENIS, in Bull. Jard. Bot. Buitenz., sér. 3, 12, p. 173 (1932).

As to the synonymy I will remark that I have not seen the originals of LAMARCK's species, but that I have followed the British-Indian florists in the interpretation of the name *A. hexapetalum*. Yet it was not possible to decide, in each separate case, what plant exactly these botanists meant by *A. hexapetalum* and *A. decapetalum*. The type of *A. salvifolium* (*Grewia salvifolia* LINN.F.) I saw in SMITH's herbarium at London.

MALAY PENINSULA. Perak: SCORTECHINI s.n. (L); Larut, 90—150 m el., KING's coll. 5590 (B, BD, BM, K); Singapore: Changi, RIDLEY 6020 coll. MAT (BM, S); Sungei Jurong, RIDLEY 6775 (S).

SIMEULOEË. ACHMAD 339 (B, K, L, S), v.n.: *sikilir silai.*

SUMATRA. Palembang, Soekaradja, R. Roepit, 240 m alt., FORBES 2984 (BM); G. Dempo, 1400 m alt., AJOEB (Exp. JACOBSON) 445 (B); Lampongs, cultivated in the Buitenzorg Botanic Garden, under XVII. C. 135 (B), probably from fruit of the following: Tjanti, TEYSMANN 4251 H.B. (B, K, L, U, originals of *Alangium sundanum* MIQ. var. β).

POELOE SEBESI. TEYSMANN 4473 H.B. (B, L, U, in the latter originals of *Alangium sundanum* MIQ.), v.n.: *wait sesatak.*

ANAMBAS ISLANDS. Siantan, near Terempa, 60—90 m alt., HENDERSON 20197 (B, S); east of Terempa, 250 m alt., VAN STEENIS 909 (B, S).

JAVA. Without exact locality: cultivated in the Buitenzorg Botanic Garden under XVII. C. 136 & 136a (B); TEYSMANN s.n. (L); TEYSMANN & DE VRIESE s.n. (L); DE VRIESE s.n. (L); „Bonserang", coll.? s.n. (L); Oedjong Genteng near Djampang Koelon, 1 m el., BACKER 17546 (B); between Weltevreden and Mr. Cornelis, Salemba, in a garden, 20 m alt., BACKER 32021 (B); Buitenzorg, Tjikeumeuh, 250 m alt., BUSSE 1489a (BD); south of Weleri, 300 m alt., BACKER 16604 (B); Ngarengan (Djapara), 50 m alt., KOORDERS 33654 β (B); for. no. 2456*, herb. no. 35114 β (B, L); for. no. 2456bis*, herb. no. 33587 β (B); Tjabak, Blora (Rembang), KOORDERS 40406 β (B); Soerabaja, HORSFIELD s.n. (U, from this locality probably also in BM, K, L, originals of *Alangium sundanum* MIQ.); Malang, HORSFIELD s.n. (K); Lamadjang Tenga, ZOLLINGER 2289 (B, BD, BM, K) type no. of *Alangium frutescens* ZOLL., „corolla flavescente-albida, odorifera, frutex subsarmentosa"; Djember, 100 m alt., BACKER 17764 (B); Poeger Watangan, 10 m alt., KOORDERS for. no. 1249*. herb. no. 21321 β (B, BD, L); Tjoeramanis, KOORDERS 38488 β (B, L); Ragadjampi Balak, Kedoenen (Banjoewangi), KOORDERS for. no. 1152*, herb. no. 29098 β (B), v.n.: *lantoro*; Bama (Bomo), near Kedoenen, KOORDERS for. no. 1409*, herb. no. 29125 β (B, BD, K, L), v.n.: *lantoro*; Bama, TEYSMANN s.n. (B, L, the former authentic specimen of „*Alangium frutescens* Z. & M.").

KANGEAN ISLANDS. Cultivated in the Buitenzorg Botanic Garden under III. G. 60 & 60a (B), and IX. A. 22a (B), from Kangean; Kangean, Doekoh, DOMMERS 82 (B), v.n. *topo topo boerih,* and DOMMERS 216 (B), v.n.: *kantjiloed.*

BALI. G. Goendoel, VAN DER PAARDT 66 (B), v.n.: *melati.*

SOEMBAWA. Between Boeër and Alas („Bner & Allas"), ZOLLINGER 3391 Z.M. (B, BM).

SOEMBA. TEYSMANN s.n. (B, L), v.n.: *kemali wateh.*

SELEBES. Paré-paré, Kp. Sapagaloeng, NOERKAS (Exp. VAN VUUREN) 287 (B, L); Pangkadjéne, TEYSMANN 11849 (B, L), 11894 (B, L), 12117 (B, L), 12436 (B, L).

SALAJAR. TEYSMANN 13832 H.B. (B, L).

NEW GUINEA. Probably near the Triton Bay, ZIPPELIUS 197c (B, L).

Moreover cultivated in the Buitenzorg Botanic Garden, of unknown provenance, under XII. B. 207 & 207a (B, L, U), XII. B. 210a (B), and XVII. C. 133a (B).

Further distribution: Comores, W. & S. coast of India, Ceylon, Andamans, Philippines (?).

2. **Alangium longiflorum** MERRILL — *Internodes* between the adult leaves 1.8—5.2 cm long, 1—4 mm thick, tomentose. *Petiole* 8—12 mm long, tomentose; lamina obovate-oblong or somewhat broader or narrower, slightly asymmetrical, 5.5—18 cm long, 3—8.5 cm long, 3—8.5 cm broad, with the base rounded to cuneate at the broad side, usually cuneate at the narrow side, rather long-acuminate towards the obtuse apex, chartaceous, triplinervous at the base, moreover with 5—7 lateral nerves on each side of the midrib, on the upper side only the midrib and the strong lateral nerves shortly appressedly hairy, on the underside moreover all lateral nerves. *Inflorescence* tomentose, once or twice branched, 1—5-flowered, 3—7 mm long (the flowers excluded), sessile or nearly so, the peduncle 0—1.5 mm long, the pedicels 2—6 mm long; bracts triangular, 0.75—1 mm long, 1 mm broad. *Flower* 30—50 mm long; calyx tomentose, the tube campanulate-infundibuliformous, 1—2 mm long, the limb infundibuliformous to cupuliformous, 1—1.5 mm long, 2.5—3 mm wide, with teeth 0.25—0.5 mm long; corolla usually 5-merous, subcylindrical in the bud state, hardly swollen in the basal portion, somewhat swollen in the upper one-third part, up to 3—4 mm thick, often shortly abruptly acuminate towards the obtuse tip; petals 34—49 mm long, thin- but dense-tomentose outside, sparingly shortly appressedly pilose at the inside except in the basal 5 mm; stamens 2—6 × as many as petals, 33—48 mm long; filament filiformous, 27—40 mm long, 0.2—0.5 mm thick, from 6 to 11 m above the base long-pilose; anther 6—8 mm long, acute at the base and the tip, with glabrous connective; style glabrous, 31—46 mm long, 0.3—0.4 mm thick; stigma capitate, 1 mm long, 1.25—1.5 mm in diameter; disc 0.5 mm high, 1.25—1.5 mm in diameter; ovary one-celled. *Fruit* in the dry state ellipsoidal or oviformous, rounded at the base and the apex, 17—20 mm long (incl. the calyx), 14—16 mm broad, 10—12.5 mm thick, glabrous or thin-tomentose, sometimes sulcate and with 10—12 ribs, crowned by the calyx limb 1—1.5 mm long, 3.25—3.5 mm wide, and the somewhat shorter disc. (Description after the Borneo specimen and Philippine materials from Luzon, Negros, Samar, Mindanao and Tawi-tawi). **Cfr. fig. 1, i.**

Alangium longiflorum MERRILL, in Phil. Journ. Sc., bot., 7, p. 319 (1912); Enum. Phil. Fl. Pl., 3, p. 240 (1923); QUISUMBING, in Philipp. Agric., 13, p. 441, t. 1 (1925).

BORNEO. Mt. Kinabalu, Penibukan, 1200 m el., CLEMENS 30527 (B, NY), tree 15 m high, 25 cm diam.; Sarawak, Kuching, KALONG (HAVILAND) 1505 (K, Sa), small tree, petals white.

Distribution: Philippine Islands.

3. **Alangium hirsutum** BLOEMBERGEN, n. sp. — *Internodia* inter folia adulta 6—26 mm longa 2—4.5 mm crassa, statu juvenili hirsuto-tomentosa postea hirsuta, denique glabrescentia. *Petiolus* 4—9 mm longus, hirsuto-tomentosus; lamina plerumque obovato-oblonga, subsymmetrica, 3.6—13.5 cm longa, 1.5—5.75 cm lata, basi rotundata, apicem acutum vel obtusum versus subabrupte breviuscule acuminata, chartacea, facie superiore costa tantum hirsuta, facie inferiore etiam nervis venisque hirsutis, basi vix triplinervi, nervis lateralibus 7—10 utrinque. *Inflorescentia* hirsuto-tomentosa, 1—2-flora, sessilis, pedicellis c. 0.5 mm longis; bracteae triangulares, 0.75—1 mm longae 1 mm latae. *Flos* c. 25 mm longus; calyx dense hirsuto-tomentosus; tubus campanulatus 2 mm longus, limbus infundibuli-cupuliformis, 1.2 mm longus, 3.5 mm latus, dentibus 0.5 mm longis; corolla 5—7-meres, petalis c. 22.5 mm longis, facie exteriore parce breviterque pilosis, facie interiore a 6 mm usque ad 8 mm supra basin magis pilosis, ceterum parce breviterque pilosis; stamina c. 15, 20—21 mm longa; filamentum 12—13 mm longum, filiforme, 0.1—0.25 mm crassum, parte basali 6—10 mm longa excepta pilosum; anthera 8—9 mm longa, basi apiceque acuta, connectivo glabro; stylus glaber 22 mm longus, c. 0.3 mm crassus; stigma capitatum vel semiglobosum, 0.7 mm longum, 1 mm diametro; discus 0.5 mm altus 1 mm diametro; ovarium uniloculare. *Fructus* in herbario ellipsoides vel oviformis, basi apiceque acutus, 28—32.5 mm longus (calyce incluso), 13—15 mm latus, 12—13 mm crassus, tenuiter tomentosus vel glaber, nonnunquam sulcis c. 6 levibus vel profundioribus, limbo calycis c. 1.5 mm longo 2.5—3 mm lato et disco minus alto coronatus. (Description after the Borneo materials). **Cfr. fig. 1, f—h.**

A. hirsutum is closely allied to *A. longiflorum* and *A. brachyanthum* MERR., less closely to *A. salvifolium*. From *A. longiflorum* it differs by shorter flowers and more hirsute indumentum, from *A. brachyanthum* by longer flowers, whereas the leaves of the latter species are not known with certainty and the fruit quite unknown. From *A. salvifolium* our species differs by filaments without thickened basal portion.

The Sumatra specimen, not taken up in the description, is only fruit-bearing and differs from the Borneo plant by the less hirsute indumentum and the fruit only 22 mm long.

BORNEO. Western Part, Amai Ambit, HALLIER B. 3238 (B, type, L).
Perhaps also:
SUMATRA. Palembang, BOSCHPR. T. 52 (B, L).

Section II. *Stamens as many as petals and calyx teeth. Style cylindrical with capitate 4-lobed stigma. Endosperm smooth. Radicle shorter than half the length of the cotyledons.* Species 4—8. **Fig. 2.** — Stems either sympodial, branching from the axils of the former vegetation period (species 4—6), or monopodial and branching from the axils of the last vegetation period (species 7—8). Leaves usually asymmetrical, nearly ovate-cordate, usually palminervous at the base, rarely entirely penninervous (spec. 7). Inflorescences with distinct peduncle, branches and pedicels, but the bracts little developed. Style glabrous or hairy. Ovary 1—2-celled. Fruit and seed flattened.

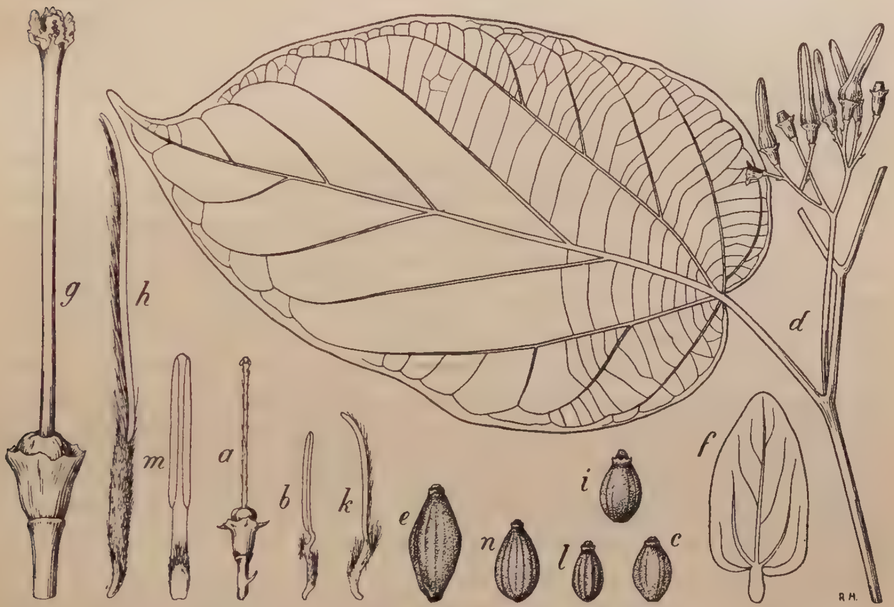

Fig. 2: *Alangium* sect. II **a—c**: *A. chinense*; **a**: calyx with pistill, 2½ ×; **b**: stamen, $2^{1}/_{2}$ ×; **c**: fruit, $^{3}/_{5}$ ×; **d—f**: *A. rotundifolium*; **d**: twig fragment with leaf and inflorescence, $^{3}/_{5}$ ×; **e**: fruit, $^{3}/_{5}$ ×; **f**: embryo, $2^{1}/_{2}$ ×; **g—i**: *A. Kurzii*; **g**: calyx with pistill, $2^{1}/_{2}$ ×; **h**: stamen, $2^{1}/_{2}$ ×; **i**: fruit, $^{3}/_{5}$ ×; **k—l**: *A. scandens*; **k**: stamen, $2^{1}/_{2}$ ×; **l**: fruit, $^{3}/_{5}$ ×; **m—n**: *A. Griffithii*; **m**: stamen, $2^{1}/_{2}$ ×; **n**: fruit, $^{3}/_{5}$ ×; **a**, **b**, after LÖRZING 640, **c** after KOORDERS 30232β, **d** after WINCKEL 1570β, **e**, **f**, after FOX 122, **g**, **h**, **i**, after LÖRZING 8960, **k** after ENDERT 4076, **l** after ENDERT 4052, **m** after LAMBACH 2720, **n** after FORBES 2739.

4. Alangium chinense (LOUREIRO) REHDER — *Internodes* between the adult leaves 2—8 cm long, 2—4.5 mm thick, glabrous or somewhat appressedly short-hairy, especially near the insertion of the leaves. *Petiole* 16—60 mm long, appressedly hairy or glabrescent; lamina roundly- or triangular-ovate in outline, 5—28 cm long, 3—27.5 cm broad, often with a number of large acuminate teeth or lobes, asymmetrical, more or less obliquely cordate, usually cuneate at the narrow side, rather long and abruptly acuminate towards the acute or subobtuse apex, chartaceous, nearly glabrous at both sides or more or less shortly appressedly hairy on the nerves below, usually 5—9-plinervous, moreover with 3—6 lateral nerves at each side of the midrib. *Inflorescence* sparingly shortly appressedly hairy, 1—4 × branched, 3—23-flowered, 2.2—8.5 cm long (excl. the flowers), the peduncle 1—4.5 cm long, the pedicels 5—22 mm long; bracts linear or filiformous, 0.75—5 mm long, 0.1—0.5 mm broad. *Flowers* 9—18.2 mm long; calyx densely appressedly hairy, the tube campanulate to infundibuliformous, 1—2 mm long, the limb spreading or cupuliformous, 0.5—1 mm long, 1.5—4 mm wide, with teeth 0.25—0.5 mm long; corolla 6—8- usually 7-merous, in bud subcylindrical somewhat swollen above the base, 1.5—4.5 mm thick, obtuse at the apex; petals 8—16.2 mm long, sparingly and appressedly short-hairy outside, glabrous or with few hairs little above the base; stamens as many as petals, 7.5—15.2 mm long; filament 2.5—5.75 mm long, with a lower portion 2—5 mm long, 1—1.2 mm broad, thickened and bearded at the apex inside, moreover pilose at the outside and the margins, and an upper portion 0.5—0.75 mm long, glabrous; anther 5—10 mm long, connective glabrous; style 7—15 mm long, nearly 0.5—0.75 mm thick, pilose on longitudinal stripes; stigma capitate, 1 mm long, 1.2—1.6 mm thick; disc semiglobose, slightly angular, 0.9—1.75 mm high, 2—2.25 mm in diameter; ovary 2-celled. *Fruit* 2-locular, 2-seeded, in the herbarium oviformous or ellipsoidal, rounded or somewhat acute at the base, more acute at the apex, 9—13 mm long (incl. the calyx limb), 6—7 mm broad and thick, sometimes sparingly short-hairy, sometimes superficially ribbed and grooved, crowned by the calyx limb 0.75 mm long 2.5 mm wide, and the exserted 1.5—2 mm high disc (Description after the materials mentioned below). **Cfr. fig. 2, a—c.**

According to notes on herbarium labels *A. chinense* is a shrub or tree, up to 12 m high or even higher, with a bole up to 8 cm thick or even thicker; the flowers are fragrant, the corolla, filaments and style white, the anthers yellow, the ripe fruit dark violet. It occurs from 20 to 1400 m above sea level and flowers in very different times of the year.

Stylidium chinense Loureiro, Fl. cochinchin., 1, p. 221 (1790); *Stelanthes solitarius* Stokes, Bot. Mat. Med., 2, p. 339 (1812); *Marlea begoniaefolia* Roxb., Hort. Beng., p. 28 (1814) nom. nud.; Pl. corom., 3, p. 80, t. 283 (1819); D.C., Prodr., 4, p. 267 (1830); Roxb., Fl. ind., ed. 2, 2, p. 261 (1832); Griffith, Ic. pl. as., 1, t. 45, 2 (1847); 4,t. 639 (1854); Miq., Fl. Ind. Bat., I, 1, p. 774 (1856); Benth., Fl. hongk., p. 138 (1861) p.p.; Kurz, Journ. As. Soc. Beng., 40, II, p. 61 (1871); Roxb., Fl. ind., ed. 3, p. 326 (1874); Brandis, For. fl., p. 251 (1874); Kurz, For. fl. Burma, 1, p. 544 (1874); Clarke, in Hook.f., Fl. Br. Ind., 2, p. 743 (1879) p.p.; Koord. & Valet., Bijdr. Booms. Java, 5, p. 82 (1900) cum var. *palmatidentata*; Gamble, Man. Ind. timb., ed. 2, p. 389 (1902) saltem p.p.; Brandis, Ind. trees, p. 355 (1906) saltem p.p.; Janssonius, in Moll & Janss., Mikrogr., 3, p. 719 (1918); *Stylis chinensis* Poiret, in Lam., Enc. méth., bot., suppl. 5, p. 260 (1817); *Marlea affinis* Decaisne, in Jacquem., Voyage Ind., 4, bot., p. 74, t. 83 (1844); Schnitzl., Iconogr., 4, t. 262, ic. 1—14 (1849); *Alangium cordifolium* Zolling., Syst. Verz. 1842—1848, fasc. 3, p. 63 (1855); *Marlea virgata* Zolling., Nat. Tijdschr. Ned. Ind., 14, p. 157 (1857); *Alangium begoniaefolium* Baill., Hist. pl., 6, p. 270 (1877) prob., excl. ic. 249—252; Harms, in Engl. & Prantl, Nat. Pflanzenfam., III, 8, p. 261 (1898) saltem p.p.; Wangerin, in Engl., Jahrb., 38, Beibl. 86, p. 61—68 (1906) saltem p.p.; Koorders, Exkursionsfl., 2, p. 731 (1912); Hallier, in Elbert, Sunda-Exp., 2, p. 285 (1912); Koord. & Valeton, Atlas, 1, t. 187 (1913); Heyne, Nutt. Pl. Ned. Ind., ed. 1, 3, p. 402 (1917); ed. 2, 2, p. 1217 (1927) excl. var. *tomentoso*; Bruggem., Bull. Jard. Bot. Buitenz., ser. 3, 9, p. 204, 216 (1927) ?; *Karangolum chinense* Kuntze, Rev. gen. pl., 1, p. 273 (1891); *Alangium begoniifolium* ssp. *eubegoniifolium* Wangerin, in Engl., Pflanzenr., IV, 220b, p. 20 (1910); Koord., Exkursionsfl., 2, p. 733 (1912); Koord.-Schum., Syst. Verz., 1, fam. 229, p. 100 (1912); *Marlea chinensis* Druce, Rep. Exch. Cl. Brit, Isl., 1916, suppl. 2, p. 634 (1917); *Alangium chinense* Rehder, in Sargent., Pl. Wilson., 2, p. 552 (1916) p.p.; Merrill, En. Phil. Fl. Pl., 3, p. 240 (1923) excl. ssp. *tomentoso*; Evrard, in Lec., Fl. Indo-Ch., 2, p. 1187, ic. 142, 143, 1—2 (1923) p.p.; Melchior, Notizbl. Bot. Gart. Berl.-Dahlem, 10, p. 825 (1929) excl. var. *tomentoso*; Craib, Fl. Siam. Enum., 1, p. 805 (1931). —

As to the synonymy of this species I may remark that of *Stylidium chinense* Loureiro I saw an original in the Herbarium of the British Museum at London.

From *A. chinense* I keep *A. rotundifolium* and *A. Kurzii* apart as separate species, for the argumentation of which cfr. *A. rotundifolium*.

A. chinense, as accepted here, is rather uniformous in the area dealt with. Some youth forms (either young plants or suckers from old roots) are strikingly different by thicker twigs with longer internodes, more scarce indumentum soon falling off, larger leaf blades (up to 28 cm long and broad) that are more often toothed or lobed, less asymmetrical and with thinner texture, and longer petioles; forms comprised by Koorders & Valeton in their var. *palmatidentata,* with more deeply regularly and constantly lobate leaves, are not youth forms, but appear to be too little important to be distinguished as a variety.

Java. Without exact locality: Blume (?) s.n. (L); Junghuhn s.n. (K); Warburg 4671 (BD); G. Tjitjajoer near Pangentjongan, Koorders 1303β (B, L); Tjibodas, N 2 (B); Temanggoeng (Kedoe), 600 m el., Lörzing 640 (B, BD), v.n.: *woeroe pas*; teak-forest Karangasem, north of Wirosari (Semarang), 200 m el., Koorders 868β (B, K, L), 869β (B); forestry Telawah (Semarang), tree no. Tl. 220, Vincent 4671 (B, L), v.n.: *timangan*; G. Kidoel, between Djepitoe & Kala (Soerakarta), 200 m el., Backer 2829 (B); Pandan (Madioen), 400—900 m el., Elbert

478 (L); Prigi (Kediri), Teysmann s.n. (L, U); Wanasalim, „M. Brubu", 450 m el., Zollinger 2292 (B, BD, BM, K), type number of *Alangium cordifolium* Zoll.; G. Kawi, Warburg 4672 (BD); Soerabaja, Horsfield s.n. (BM, K), v.n.: *gedreg, opas-opasan*; G. Tengger, Lawang, Mousset 264 (B), 1923 (B, L), shade tree in coffee plantations; Wanakerta, S.W. of Gondanglegi, 500 m el., Backer 3529 (B); the collector asking the name to 10 Javanese passing by, got the following answers: *ègrèk* 1 ×, *kladjang* 1 ×, *mangar* 2 ×, *paron* 1 ×, *tètè* 1 ×, *tibò* 1 ×, *timò* 2 ×, whereas one did not know a name; forest Djenggolo near pasanggrahan Kaliparé, 300 m el., Koorders for. no. 2917*, herb. no. 23676β (B); G. Tengger, 1200 m, Buysman s.n. (B, U); Djatirata, 20 m el., Backer 7975 (B); Poeger, Koorders, for. no. 1837*, herb. no. 30232β (B, L), v.n.: *goprak*; Tjoeramanis near Simpolan (Besoeki), 500 m el., Koorders for. no. 2167*, herb. no. 20934β (B); Idjen-plateau, forest Simpol, 1150 m el., Koorders for. no. 26*, herb. no. 14384β (B, L), v.n.: *opas-opasan*; Idjen, Kendeng, kloof Katjèp, 1500 m el., Clason 989 (B, G); G. Kemiri Sanga, near Djember, 150 m el., Backer 30578 (B); G. Idjen, western slope, 1000 m el., Backer 25396 (B); Idjen-plateau, near Belawan, 1000 m el., Backer 25231 (B); Banjoewangi, Blume s.n. (L), v.n.: *upas-upassan.*

Bali, between Boelèlèng and Gitgit, Teysmann 2745 H.B. (B, L, U), v.n.. *lengoeng.*

Soembawa. Donggo Mts., K. Mange, 300 m el., Warburg 17093 (BD), v.n.: *sanga*; with 2 labels: „Sumbawa, 4000′, Warburg 17094 v.n.: *padati*, Strauch", and „Sumbawa, Donggo Geb., K. Kenante, 1200′, Warburg s.n., v.n.: *sanga*, Baum" (BD); Bima, Mata, Colfs 180 (L), v.n.: *kailon gadong*; G. Poesoe, W. of Batoelantèh, 700—900 m el., Elbert 4153 (L); G. Batoelantèh, N. slope, 800—1400 m el., Elbert 4179 (L).

Soemba. Taboendoeng, Teysmann 8957 H.B. (B); G. Harara, 560 m el., Boschpr.bb. 5414 (B), v.n.: *kambah.*

Flores. Wai Sano (W. Flores), 650 m el., De Jong 38 (B).

Further distribution: Tropical Africa, southeastern Asia from British India and China to the Philippines and southwards.

5. **Alangium rotundifolium** (Hasskarl) Bloembergen n. comb. — *Internodes* between the adult leaves 1.2—7 cm long, 2—6.5 mm thick, in the young state with traces of a woolly tomentum. *Petiole* 7—55 mm long, 1—2 mm thick, hairy like the twig; lamina roundish to ovate or triangular-ovate, sometimes with few large teeth or lobes at each side, asymmetrical, 5.5—22 cm long, 3.5—18 cm broad, rounded to cordate at the base, often cuneate at the narrow side, rather long and often abruptly acuminate towards the acute or obtuse apex, chartaceous to thin-coriaceous, sparingly short-hairy on the nerves, very sparingly between the nerves above, slightly woolly hairy to hirsute on and between the nerves below, rarely entirely glabrous or more woolly tomentose on the whole lower surface (but never soft-tomentose), 5—7-plinervous at the base, moreover with 4—7 lateral nerves on each side of the midrib. *Inflorescence* thin-tomentose or more glabrous, 3—4 × branched, 2—13-flowered, 12—52 mm long (flowers excluded); peduncle 6—35 mm long,

pedicels 6—15 mm long; bracts filiformous to triangular, 0.5—2.5 mm long, 0.5 mm broad, *Flowers* 7.5—24 mm long; calyx tomentose, tube infundibuliformous to cylindrical, 1—3 mm long, limb spreading, 1 mm long, 3.5—3.75 mm in diameter, with teeth 0.25—0.5 mm long; corolla 6—9- usually 7-merous, in bud subcylindrical 1.75—3 mm thick, swollen and up to 4 or 5 mm thick above the base, slightly swollen at three-quarters of the length, obtuse at the tip; petals 6.5—21 mm long, thin-tomentose to nearly glabrous outside, long-pilose at the inside in the lower dilate part, along the margins and at the apex; stamens as many as petals, 6—19.75 mm long, filament 0.75—7.5 mm long, with a lower part 0.75—5.5 mm long 0.5—3.5 mm broad broadest in the middle and not thickened at the apex, pilose outside and along the margins inside, and an upper part 0.4—1.5 mm long 0.3—0.5 mm broad, long-hairy at the inside; anther 5—12.25 mm long, 0.75—1 mm broad, with a connective long-pilose inside up to the tip; style glabrous, 6—15 mm long, nearly 0.3 mm—0.7 mm thick; stigma capitate, 1.25 mm long, 1.5 mm thick; disc truncate-conical, 0.5—2 mm high, 1.5—1.75 mm in diameter, with 6—9 longitudinal grooves; ovary usually one-celled, rarely 2-celled with unequal cells. *Fruit* usually one-celled and one-seeded, rarely with a second little-developed cell, ovate-oblong-ellipsoidal in the dry state, often flattened, cuneate or rounded at the base, acute at the apex, 16—28 mm long (incl. the calyx), 7—11 mm broad, 5—8 mm thick, glabrous or thin-tomentose, sometimes slightly grooved, crowned by the spreading calyx limb 1—1.5 mm long 3.5—4 mm in diameter, and the exserted disc 2 mm high. (Description after the materials enumerated). **Cfr. fig. 2, d—f.**

According to the notes on the herbarium labels *A. rotundifolium* is always a tree, usually 15—26 m high, with a bole 38—50 cm thick, with flowers fragrant, corolla white or cream-coloured or yellowish, filaments and style white, anthers yellow. It occurs from 400 to 1625 m above sea level.

Marlea tomentosa ZOLLINGER, Syst. Verz. 1842—1848, fasc. 3, p. 63 (1855); *Tetrameles rufinervis* MIQ., Pl. Junghuhn., p. 401 (1855) p.p.; Fl. Ind. Bat., I, 1, p. 726 (1856) p.p.; *Diacaecarpium rotundifolium* HASSKARL, Bonplandia, 7, p. 172 (1859); *Marlea rotundifolia* TEYSM. & BINNEND., Catal. Pl. Hort. Bot. Bogor., p. 238 (1866); GRESHOFF, Meded. 's Lands Plantent., 25, p. 91 (1898); *Alangium begoniifolium* HARMS, in ENGL. & PRANTL, Nat. Pflanzenfam., III, 8, p. 261 (1898) p.p.; *Marlea tomentosa* var. *rotundifolia* KOORD. & VALET., Bijdr. booms. Java, 5, p. 79 (1900); JANSSON., in MOLL & JANSSON., Mikrograph., 3, p. 695, 717 (1918); *Alangium tomentosum* (non LAMARCK 1783) WANGERIN, in ENGL., Jahrb., 38, Beibl. 86, p. 64 (1906) p.p.; KOORDERS, Exkursionsfl. Java, 2, p. 731 (1912) p.p.; *Alangium begoniifolium* ssp. *tomentosum* var. *vulgare* WANGERIN, in ENGL., Pflanzenr., IV, 220b,

p. 22 (1910); *Alangium begoniifolium* ssp. *tomentosum* var. *typicum* (non WANGERIN 1910) HALLIER, Meded. 's Rijks Herb., 1, p. 13 (1911) p.p.; *Alangium begoniifolium* ssp. *tomentosum* KOORD., Exkursionsfl. Java, 2, p. 733 (1912) p.p.; KOORD.-SCHUM., Syst. Verz., 1, fam. 229, p. 101 (1912) p.p.; KOORD., Fl. Tjib., 2, p. 237 (1923) p.p.; BRUGGEMAN, Bull. Jard. Bot. Buitenz., ser. III, 9, p. 203, 216 (1927) p.p.?; *Marlea begonifolia* RIDL., in Journ. Fed. Mal. St. Mus., VIII, 4, p. 44 (1917); *Alangium chinense* ssp. *tomentosum* var. *vulgare* MERRILL, En. Phil. Fl. Pl., 3, p. 240 (1923)?; *Alangium rotundatum* RIDLEY, ex BURKILL & HENDERS., Gard. Bull. Str. Settl., 3, p. 380 (1925); RIDLEY,, Fl. Mal. Pen., 5, p. 213 (1925); *Alangium Kurzii* (non CRAIB 1911) HERDERSON, Gard. Bull. Str. Settl., 7, p. 107 (1933).

About the synonymy of this species little has to be added. Only the invalidness of the name *Tetrameles rufinervis* must be elucidated with few words. HALLIER (in Meded. Rijks Herb. Leiden, 1, p. 13) mentions that he found this name to be a synonym of *Alangium begoniifolium* ssp. *tomentosum* var. *typicum*. Besides that this remark contains a small mistake (var. *vulgare* had been better), there is a circumstance that invalidates this name. The type in the Leiden Herbarium not only comprises a leafy twig clearly belonging to *A. rotundifolium*, but also a cover containing a fruit, that very probably belongs to the same species, and a number of catkin-like inflorescences belonging to quite a different genus. From MIQUEL's description it is evident, that the name *Tetrameles rufinervis* was based as well upon these inflorescences as upon the leafy twig. Therefore it is impossible to settle, to what genus MIQUEL's *Tetrameles rufinervis* has to be placed, and so this name has no nomenclatorial value at all.

Of the species *Alangium chinense*, *A. rotundifolium* and *A. Kurzii*, distinguished in this paper, KOORDERS and VALETON mention the first as *Marlea begoniaefolia*, the other ones as varieties of *Marlea tomentosa*. WANGERIN mentions them all, as subspecies and varieties, under one specific name, viz. *Alangium begoniifolium*. Having had the opportunity to examine much more materials of these forms than former authors, I endeavour to say, that there are good grounds for taking them apart as three good species. The impression that they are only varieties is taken away especially by a better knowledge of the fruit. The differences between the fruit once known, we can always distinguish the species also by means of differences in leaf-shape, and indumentum, except in some cases of very extreme varieties. Among the three species mentioned, *A. Kurzii* is very uniformous, whereas *A. rotundifolium*, on the contrary, is very polymorphic. Not knowing the characters of the fruit, one is, of course, inclined to unite with the many varieties of *A. rotundifolium* also *A. Kurzii*, as KOORDERS and VALETON did.

About the variability of *A. rotundifolium* the following remarks may be made. The specimens from the Malay Peninsula have leaves sparingly hairy, small flowers (8—18 mm long), large fruit (20—28 mm long); the specimens from Pulo Tioman are also sparingly hairy, but are aberrant by shorter petioles (7—15 mm), strongly asymmetrical leaves with cuneate base, short calyx tube (1 mm), corolla buds not swollen in the basal portion, short filaments (0.75—1 mm), connectives very strongly hairy, disci only 0.5—0.75 mm high. These differences are not important each for themselves, but give a rather uncommon appearance to the plants. The lack of fruit, the occurring of these specimens at an elevation of 60—240 m only, and the existence of glabrous varieties of *A. Kurzii* in Siam, China and Indo-China, justify some doubt, whether these specimens from P. Tioman must not be reckoned to *A. Kurzii*.

The specimen from P. Tinggi is, to a certain degree, intermediate between those from P. Tioman and those from the Malay Peninsula, but by large flowers reminds to forms from Sumatra and Java. For the rest the latter have no special appearance, but are very different in all respects, and also in Java there occur forms that, by the more abundant indumentum, come nearer to *A. Kurzii,* though the fruit of these specimens, if present, is that of pure *A. rotundifolium*; moreover the indumentum is never so dense as in *A. Kurzii* and is of a different nature, viz. more hirsute and never soft-tomentose.

The specimens from Mt. Kinabalu agree with those from the Malay Peninsula as to the leaves. They are, however, remarkable by nearly always 2-celled ovaries and fruit, and connectives sparingly hairy for the species and even glabrous in the upper one-half.

Among the specimens enumerated below, there occur, as among those of *A. chinense,* a number of youth forms, either young plants, or suckers from old roots. They are different by thicker twigs (2—7.5 mm), longer internodes (3—12 cm) and petioles (2.5—20 cm), larger leaf-blades (11.5—27 by 10—26 cm), that are less asymmetrical and more distinctly dentate or lobate. By lack of flowers it is not always certain, whether these forms belong to *A. rotundifolium* or perhaps partly to *A. Kurzii* or *A. chinense.*

Malay Peninsula. Perak: below Sea Gardens, 300 m el., Curtis 2689 (S); Maxwell's Hill, 1200 m el., Fox 122 = Ridley 10675 (S); 1140 m el., Burkill & Haniff 12851 (B, K, S), type number of *Alangium rotundatum* Ridl.; Gunong Hijau, 1260 m el., Henderson 11833 (S); Pahang: Pulau Tioman, Bukit Sukak, 60 m el., Henderson & Nur 18554 (S); P. Tioman, Sedagong, 240 m el., Henderson & Nur 21750 (K, NY, S); Johore: Pulau Tinggi, Burkill 907 (S).

Sumatra. Karo-regions, Laut Kawar, Doesoen Sigaranggarang, 1500 m el., Boschpr.bb. 8632 (B), v.n.: *pialee boenga*; Kp. Tongkoh, 1500 m el., Boschpr.bb. 6818 (B), v.n.: *sikan-ikan*, and 7202 (B), v.n.: *panggang-panggang*; G. Singgalang (near Padang), Beccari P.S. 68 & 226 (BM, K, L); Airmantjoer (near Padang), 360 m el., Beccari P.S. 611 (L); G. Kerintji, „Sungei Penoh", 810 m el., Robinson & Kloss 19 (BM, K); Lebong (Bengkoeloe), alt. 700 m, Boschpr.bb. 15, 729 (B), v.n.: *moesang*; Rimbo Pengadang (Bengkoeloe), 1000 m el., Ajoeb (Exp. Jacobson) 180 (B); Karanganjar (Redjang, Bengkoeloe), 950 m el., Boschpr.bb. 7289 (B), v.n.: *moesang.*

Borneo. Mt. Kinabalu, Tenompok, 1500 m, Clemens 26705 (B, NY), 29650 (B, NY).

Java. Without exact locality: „Tikooet", Van Hasselt s.n. (L); Korthals s.n. (L); Forbes 1899 (L); 900—1800 m el., Junghuhn s.n. (Koorders' Plantae Junghuhnianae ineditae 58 & 59) (K, L), v.n.: *ki-bungulang, ki-hantap*; „Tjipannas" (where ?), 900 m el., Zollinger 803 (B); Tjianten, south of Leuwiliang, near Buitenzorg, 900 m el., Backer 25721 (B); Nangèla near Poerwasèda, S.W. of Leuwiliang, 450 m, Bakhuizen van den Brink 7718 (B), v.n.: *mara bangkong*; G. Salak, Reinwardt s.n. (L), v.n.: *kilutong*; Koorders 24161 β (B), v.n.: *binong*; G. Gedé, 900—1500 m el., Junghuhn s.n. (L); G. Gedé, Tjibodas, Sapiin 163 (B); 1400 m el., Koorders, tree no. 3180a, of which herb. no. 1300 β (B, L), 1301 β (B, L), 12492 β (B), 22215 β (B), 25821 β (B, L), v.n.: *kitjaruh, kitjareuh*; G. Boerangrang, N. slope, 1500 m el., Backer 14187 (B); G. Semboeng, 1300 m el., Backer 12214 & 12324 (B); Sanggrawa (Djampangkoelon), 400 m el., Koorders 1302 β (B, BD, L); Tjadasmalang S. of Tjibeber, 900—1000 m el., Backer 22538 (B, L); Bakhuizen van den Brink 1561 (B, BD, L), v.n.: *kitjareuh*; Winckel 78 β (B, L, U), 750 β (B), v.n.: *kitjareuh*; 800 m el., Winckel 1570β (B, L, S, U), v.n.: *kitjareuh*; Takokak (Djampangwètan), 1050 m el., Koorders 1306 β (B, L); Takokak, way to Soekanagara, 1100 m el., Koorders 1307β (B, L), v.n.: *kitjarug?*; G. Wajang, Taloeng, 1625 m el., Bosscha s.n. (B), n.v.: *kerteuw*; Pengalengan, 1300 m el., Junghuhn s.n. (L, original of *Tetrameles rufinervis* Miq.), v.n.: *hantap*; G. Telagabodas, forest Pangentjongan, 1300 m el., Koorders 13876β (B), 1400 m el., Koorders 13982β (B, BD, K, L), v.n.: *kitjaruh*; Pangentjongan, near the pasanggrahan, Koorders for. no. 309*, herb. no. 26569β (B, K, L); Garoet, estate Pamegatan, coll. administrator of the estate s.n. (B, L, S); Noesa Gedé, in the Pendjaloe Lake, 700 m el., Koorders 47884 β (B), v.n.: *kitjareuh*; Pringamba, Bandjarnegara, 800 m el., Koorders for no. 214*, herb. no. 33904 β (B); G. Slamet, 1400 m el., Koorders 1308 β (B), v.n.: *tjipir*; G. Prahoe Dièng, N.W. slope, 1400 m el., Koorders 1309β (B), v.n.: *ketjipir*; Koorders for. no. 14*, herb. no. 11249 β (B), v.n.: *lembajoengan*; G. Andong (Kedoe), Koorders for. no. 919*, herb. no. 27703β (B, BD, L), v.n.: *woeroe bagoran*; G. Oengaran, near Medini, 900—1200 m, Junghuhn s.n. (L, U), v.n.: *tanen* or *kapen*; Kp. Pawangredjo near Malang, 1400 m el., Boschpr.Ja. 1728 (B), v.n.: *gedrèk*.

Bali. Karangasem, Kp. Poekat Seming, 900 m el., Boschpr.bb. 12220 (B), v.n.: *kombang*.

Cultivated in the Buitenzorg Botanic Garden, probably at Tjibodas, s.n., of unknown provenance (B, L), probably the type specimen of *Diacaecarpium rotundifolium* Hasskarl.

6. **Alangium Kurzii** Craib — *Internodes* between the adult leaves 3—9 cm long, 1.5—6 mm thick, tomentose. *Petiole* 13—40 mm long, 1.75—2.5 mm thick, tomentose; lamina mostly triangular-ovate, rarely more roundish or more oblong, not lobate nor dentate, 4—20 cm long, 4—15 cm broad, asymmetrical, the largest half with a rounded basal lobe, the narrow half cuneate at the base, more or less acuminate towards the acute or obtuse apex, thin-coriaceous to chartaceous, short-tomentose on the nerves above, nearly glabrous between them, entirely soft-tomentose below, 5—7-plinervous at the base, moreover with 4—7 lateral nerves at each side of the midrib. *Inflorescence* tomentose, 3—4 × branched, 5—18-flowered, 4.5—5.5 cm long (flowers excluded); peduncle 0.7—4.2 cm long, 1—2 mm thick, pedicels 3—15 mm long, 0.75—1 mm thick, often curvate; bracts filiformous to triangular, 1—3 mm long, 0.5—0.75 mm broad. *Flowers* 18.75—30.5 mm long; calyx tomentose, tube infundibuliformous, campanulate or cylindrical, 1.25—2 mm long, limb spreading, 1—1.5 mm long, 3—3.5 mm wide, with teeth 0.25—0.5 mm long; corolla 7—10- usually 9-merous, in the bud state strongly swollen and 2.75—7 mm wide above the base, nearly cylindrical 2—3 mm wide for the rest, obtuse at the apex; petals 17.5—28.5 mm long, tomentose outside, inside only hairy in the lower dilate portion from 1.5 mm up to 5 mm above the base; stamens as many as petals, 15.5—24.5 mm long, filament 4.5—8 mm long, with a lower portion 4—7 mm long, 0.75—1 mm broad, not thickened inside at the apex, long-pilose outside

and inside, and an upper portion 0.25—1 mm long, 0.5 mm broad, glabrous outside, pilose inside; anther 11—17 mm long, 1 mm broad, the connective long-pilose inside up to the apex; style glabrous, 14.5—23 mm long, nearly 0.5—1 mm thick; stigma capitate 1—1.5 mm long, 1.5—2 mm broad; disc semi-globose, 2.25 mm high, 3 mm in diameter; ovary 2-celled, one of the cells often smaller. *Fruit* usually 2-celled and 2-seeded, with one of the cells and of the seeds often smaller but rarely strongly reduced, in the dry state ellipsoidal, little compressed, nearly rounded at the base, slightly acute towards the apex, 12—14 mm long (calyx included), 6—8 mm broad, 4—7 mm thick, glabrous to thin-tomentose, sometimes superficially grooved, crowned by a calyx limb 1—1.5 mm long, 4—4.5 mm wide, and a disc 2—3 mm high distinctly exserted. (Description after the materials enumerated below). **Cfr. fig. 2, g—i.**

Alangium Kurzii is, according to notes on the herbarium labels, always a tree, up to 28 m high and with a bole up to 57 cm in diameter, in general with larger dimensions than *A. rotundifolium.* The flowers are yellow, more rarely yellowish white, more often dark-yellow or even orange or brick-red, strongly fragrant. The ripe fruit is dark-violet to almost black. The species occurs from 50—1300 m above sea level.

Diacicarpium tomentosum BLUME, Bijdr., 13, p. 657 (1825); MEISN., Genera, 2, p. 111 (1838); (*Diacec.*) HASSK., Cat. Pl. Hort. Bot. Bog., p. 169 (1844); (*Diacaec.*) HASSK., Bonplandia, 7, p. 173 (1859); *Marlea tomentosa* HASSK., Flora, 27, p. 605 (1844); DECAISNE, in JACQUEM., Voyage Ind., 4, bot., p. 75 (1844); MIQ., Fl. Ind. Bat., I, 1, p. 775 (1856); TEYSM. & BINN., Cat. Pl. Hort. Bot. Bog., p. 238 (1866); KURZ, For. Fl. Burma, 1. p. 545 (1877) saltem p.p.; SERTOR., Bull. Herb. Boiss., 1, p. 570 (1893) prob.; GRESHOFF, Meded. Lands Plantent., 25, p. 91 (1898) prob.; *Marlea begoniaefolia* BENTH., Fl. hongkong., p. 138 (1861) p.p.; *Alangium begoniaefolium* RIDL., Fl. Mal. Pen., 1, p. 894 (1922); *Marlea tomentosa* var. *genuina* KOORD. & VALET., Bijdr. Booms. Java, 5, p. 79 (1900); *Alangium tomentosum* (non LAM., 1783) WANGERIN, in ENGL., Jahrb., 38, Beibl. 86, p. 64 (1906) p.p.; KOORD., Exkursionsfl. Java, 2, p. 731 (1912) p.p.; ENDERT, Tectona, 18, p. 91 (1924) prob.; HANDEL-MAZZ., Symb. sin., 7, p. 684 (1933); CHUN, in Sunyatsenia, 2, p. 77 (1934); *Alangium begoniifolium* ssp. *tomentosum* KOORD., Exkursionsfl. Java, 2, p. 733 (1912) p.p.; KOORD.-SCHUM., Syst. Verz., 1, fam. 229, p. 101 (1912) p.p.; KOORD., Fl. Tjibod., 2, p. 237 (1923) p.p.; BAKER, in Journ. Bot., 62, suppl., p. 45 (1924); BRUGGEM., Bull. Jard. Bot. Buitenz., ser. III, 9, p. 203, 216 (1927) p.p.?; *Alangium begoniifolium* ssp. *tomentosum* var. *typicum* WANGERIN, in ENGL., Pflanzenr., 4, 220b, p. 21 (1910); *Alangium begoniifolium* var. *tomentosum* PALM, Meded. Deli-Proefst., 42, p. 19 (1925); KUYPER, Meded. Deli-Proefst., 45, p. 16 (1926); 53, p. 44 (1927); HEYNE, Nutt. Pl. Ned. Ind., ed. 2, 2, p. 1217 (1927); *Alangium Kurzii* CRAIB, in Kew Bull., 1911, p. 60 (1911); Fl. siam. enum., 1, p. 806 (1931); *Alangium chinense* var. *tomentosum* MELCHIOR, Notizbl. Bot. Gart. Berl.-Dahl., 10, p. 827 (1929);

Alangium chinense EVRARD, in LECOMTE, Fl. Indo-Ch., 2, p. 1187 (1923) p.p.; *Alangium Handelii* SCHNARF, in Akad. Anzeiger, Akad. Wiss., Wien, n. 12, p. 107 (1922); MELCHIOR, Notizbl. Bot. Gart. Berl.-Dahl., 10, p. 827 (1929); CHUN, in Sunyatsenia, 1, p. 278 (1934).

For the distinction of this species from *A. chinense* and *A. rotundifolium* cfr. the discussion of *A. rotundifolium*. The oldest species name in the genus *Alangium*, viz. *A. tomentosum* (BLUME) WANGERIN, is preoccupied by *A. tomentosum* LAMARCK; therefore the following name must be chosen, viz. *A. Kurzii*, of which I shaw the type (KERR 1172) in the Kew Herbarium. Though the average fruit dimensions of the Siamese specimens, to which the type belongs, are somewhat smaller (7.5—12 mm long), this seems insufficient to have any doubt about the specific identity of the Siamese and the Malaysian specimens.

MALAY PENINSULA. Penang: Pulu Bootong Reserve, 150 m el., CURTIS 940 (K, S); Selangor: Kepong Plantations, SOW & TACHOU 16857 (S).

SUMATRA. Bintangmeriah, W.S.W. of the Sinaboeng, 750 m el., LÖRZING 8960 (B, L), wild in ravines and planted in the kampongs, v.n.: *kalimbangbang*; Sibolangit, forest reserve, 500 m el., LÖRZING 5131 (B, L, S); Berastagi, SYMINGTON 24688 (S); Karo-regions, Katjariboe, W. of Kabandjahé, 1100 m el., GALOENGI 325 (B, L), v.n.: *kalibambang*; near Sembaikan, 190 m el., BOSCHPR.BB. 9737 (B), v.n.: *kalibangbang*; Sigorang-gorang, 1300 m el., BOSCHPR.BB. 9730 (B, L), v.n.: *kalibamban*; Masihat (afd. Simeloengoen), 150 m el., BOSCHPR.BB. 5340 (B, L), v.n.: *mohoe*; Bandarpoelau (afd. Simeloengoen), 50 m el., BOSCHPR.BB. 4922 (B, L), v.n.: *mahoe*; Porsea, 950 m el., planted in fences, LÖRZING 10058 (B), v.n.: *haoe hombo* (?); Sajoer Matinggi (afd. Angkola & Sipirok), 310 m el., BOSCHPR.BB. 4006 (B), v.n.: *hajoe misang*, Kp. Simatarkis, 450 m el. (afd. Angkola & Sipirok), 450 m el., BOSCHPR.BB. 5646 (B, L), v.n.: *hale misang*; Asahan, Silo Maradja, BARTLETT 8703 (NY); Benantigo, near G. Malintang, 1150 m el., BÜNNEMEIJER 3754 (B, L); Fort de Cock, Harau-Kloof, 450 m el., YATES 2485 (B, NY); Fort de Cock, James Park, 920 m el., THEUNISSEN 8 (B, L), v.n.: *moesang*; Lematang Hoeloe (Palembang), 150 m el., LAMBACH 1232 (B, L, S), v.n.: *èndeloepang*; Lematang Hilir (Palembang), near Goenoeng Megang, alt. 75 m, BOSCHPR. E. 1218 (B), v.n.: *koendoer*; Tandjoeng Ning, R. Bliti (Palembang), 180 m el., FORBES 2785 (BM, L, S), v.n.: *kayoe doe-etteh*.

JAVA. Without exact locality: BLUME s.n. (B, BD, L, NY, U, originals of *Diacicarpium tomentosum* BL.); JELINEK (Exp. Novara) s.n. (B); Bandoeng, estate Rongga, DES AMORIE VAN DER HOEVEN s.n. (B), v.n.: *kitjareuh*; G. Salak, BLUME s.n. (BM, L, originals of *Diacicarpium tomentosum* BL.), v.n.: *kilutung*; Pengalengan, near estate Ardjasari, 1000 m (?) el., KOORDERS for. no. 3701*, herb. no. 22258β (B, BD, K, L) (in KOORD.-SCHUM., Syst. Verz., 1, fam. 229, p. 102, with incorrect locality); forest Soember Tangkil (G. Kidoel, Pasoeroean), 400—500 m el., KOORDERS for. no. 2971*, herb. no. 23986β (B, L).

Cultivated in the Botanic Garden at Sibolangit under no. 80 (S, NY).

Further distribution: China, Southern Burma, Siam, Indo-China, Philippines (?).

7. **Alangium scandens** BLOEMBERGEN, n. sp. — *Internodia* inter folia adulta 1.5—9 cm longa, 1.2—5 mm crassa, iuventute dense piloso-tomentosa, glabrescentia. *Petioli* 11—26 mm longi, breve appresseque piloso-tomentosi; lamina ovata vel ovato-oblonga, subsymmetrica, 6—17 cm longa, 5—10 cm lata, basi plerumque rotundata vel subcordata,

raro uno latere cuneata, longiuscule et abruptiuscule acuminata versus apicem obtusum, chartacea vel tenuiter coriacea, omnino penninervis lateralibus utrinque 7—9, facie superiore glaberrima, facie inferiore appresse piloso-tomentosa in nervis crassioribus. *Inflorescentia* piloso-tomentosa, glabrescens, 3—4 × ramosa, 17—31-flora, 3—6 cm longa (floribus exceptis); pedunculus 9—40 mm longus, pedicelli 0—9 mm longi, bracteae lineares vel filiformes, raro foliaceae, 2.25—20 mm longae, 0.5—4 mm latae. *Flores* 5—7-, plerumque 6-meres, 12—15 mm longi; calyx tomentosus, tubo infundibuliformi vel campanulato, 2 mm longo, limbo patente, 0.75 mm longo, 2.5 mm lato, dentibus 0.5 mm longis; corolla statu alabastri inflata, 2—3.5 mm crassa in parte basali, ceterum subcylindrica 1.5—2 mm lata, apice obtuso; petala 10—13 mm longa, facie exteriore appresse piloso-tomentosa, facie interiore parte basali marginibus pilosis; stamina tot quot petala, 8—11.25 mm longa; filamenta 3—4 mm longa, curva, apice incrassata et barbata, marginibus pilosa, dorso puberula praecipue in parte media; anthera 4.5—7.5 mm longa, 1 mm lata, connectivo longe sericeo piloso facie interiore usque ad apicem; stylus glaber, 7—10 mm longus, 0.6—1 mm crassus; stigma capitatum, 0.75 mm altum, 1.25 mm latum; discus semiglobosus, 5—7-angularis, 1.5 mm altus, 2 mm diametro; ovarium uniloculare. *Fructus* statu sicco oviformis, basi rotundatus, calycem versus subacuminatus, 11—13 mm longus (calyce incluso), 6—7 mm latus, 5.5—6 mm crassus, glabrescens, nonnunquam leviter 10—14-costatus, calycis limbo 0.25—1 mm alto 3.5—4 mm diametro et disco 1.5—2 mm alto distincte exserto coronatus. (Description after the materials under mentioned). **Cfr. Fig. 2, k—l.**

Alangium scandens belongs, as to the characters of the flowers, inflorescences and fruit, in the alliance of *A. chinense, A. rotundifolium, A. Kurzii* and *A. Griffithii.* By the pilose connective and the glabrous style it comes nearest to *A. rotundifolium* and *A. Kurzii,* but it is easily distinguished from all species mentioned by the ovate-oblong leaves not at all palminervous at the base. In the mode of ramification *A. scandens* agrees with *A. Griffithii,* and strongly differs from the other species mentioned.

SUMATRA. Between Arnhemia and Sibolangit, 250 m el., LÖRZING 6322 (B), somewhat climbing shrub, flower-buds yellow-green; N.N.W. of Bandarbaroe, 800 m el., LÖRZING 6387 (B, L), more or less climbing shrub about 5 m high, open flowers nearly white; border of Lau Betimoes, 375 m el., LÖRZING 5714 (B), crooked tree-like shrub, with overhanging crown, nearly 8 m high; Soebanajam (Bengkoeloe), 1200 m el., AJOEB (Exp. JACOBSON) 370 (B, L).

BORNEO. Sarawak, Mt. Buan, GARAI (HAVILAND) 2018 (K, Sa), rambling shrub,

flowers pale-yellow; E. Borneo, Long Petah, 400 m el., ENDERT 4076 (B, first type, with flowers), woody climber, flowers cream-coloured outside, nearly white inside; ENDERT 4052 (B, second type, with fruit), woody climber.

8. **Alangium Griffithii** (CLARKE) HARMS — *Internodes* between the adult leaves 1.7—5 cm long, 2—6 mm thick, tomentose or hirsute-tomentose, more sparingly hairy later. *Petiole* 4—12 mm long, tomentose or more sparingly short-hairy later; lamina ovate-oblong to ovate-lanceolate, rarely ovate or somewhat obovate, asymmetrical, 4.2—18.6 cm long, 2—7.5 cm broad, usually rounded at the base, the broader half usually with large rounded basal lobe, the narrower half usually cuneate, usually rather abruptly and long-acuminate towards the acute or obtuse apex, chartaceous, sparingly hairy on the nerves, usually glabrous between the nerves above, glabrous to densely hirsute-tomentose on the thicker nerves, less hairy on the finer nerves, rarely entirely hirsute-tomentose below, 3—5-plinervous at the base, moreover with 3—5 lateral nerves at each side of the midrib. *Inflorescence* tomentose, 3—4 × branched, 6—61-flowered, 1.5—4.5 cm long (flowers excluded); peduncle 0.65—2.5 cm long, pedicels 0—2 mm long, bracts filiformous, rarely linear or foliaceous, 0.25—14 mm long, 0.2—0.75 mm broad. *Flowers* 9—18 mm long; calyx tomentose or more sparingly hairy, tube campanulate 1—2.5 mm long, limb spreading, 0.25—0.5 mm long, 2.5—3 mm wide, with teeth 0.25—0.5 mm long; corolla 4—6- usually 5-merous, in bud subcylindrical somewhat swollen up to 3 mm thick in the basal portion, very slightly thickened in the upper one-half, obtuse; petals 8—15.5 mm long, finely short-hairy or more glabrous outside, with few hairs along the margins, at the top of the dilate part and on the midrib inside; stamens as many as petals, 7—14 mm long, filament 3—4.5 mm long, with a lower portion 1.5—2.75 mm long, 1 mm broad, hairy inside at the margins, thickened and bearded at the apex, glabrous outside, and an upper portion 1.5—2.25 mm long, 0.75 mm broad, glabrous; anther 4—9.5 mm long, 0.75 mm broad, sometimes sterile and narrower, the connective glabrous; style glabrous, 0.25—0.75 mm thick; stigma capitate, 0.25—0.5 mm long, 0.8—1 mm in diameter; disc 4—6-angular, 0.75—1 mm high, 1.25 mm in diameter; ovary one-celled. *Fruit* in the dry state oviformous, flattened, rounded at the base, acute or somewhat acuminate towards the apex, 12—18 mm long (incl. calyx limb), 9—12 mm broad, 5—8 mm thick, usually glabrous, rarely superficially grooved, crowned by a calyx limb 0.25—0.75 mm high, 1.25—2 mm wide, and a disc 1 mm high, as high as the calyx or slightly exserted. (Description after all materials under-mentioned). **Cfr. fig. 2, m—n.**

According to notes on herbarium labels *A. Griffithii* is a small or moderate-sized tree, up to 18 m high, with a stem up to 30 cm in diameter, sometimes with buttresses up to 50 cm wide and spreading 50 cm, with leaves not falling off in the dry season and flowering from April to September (dry season) with flowers white to light-cream-coloured and sweet, sometimes strongly sweet scented, and with cobalt-blue ripe fruit to November. It occurs from 60—400 m above sea level.

It is remarkable that there are, among the herbarium materials, some specimens with sterile stamens in all flowers (FORBES 2813, KOORDERS 15691β, 28897β, and RUTTEN 1831); of these specimens the stamens are shorter than the style, the anthers are short, thin and obtuse, the pollen is little-developed, and the grains are shrivelled, the stigma is thicker. A similar phenomenon I observed in *A. salvifolium* ssp. *decapetalum*, especially in the Siamese specimens (e.g. HOSSEUS 440), but here the filaments were long, the anthers short and shrivelled, the stamens less in number than in fertile flowers, the stigma also strongly developed; but in this species I found also fertile stamens on the same plant and even in the same flower with sterile stamens.

For the systematic place of *A. Griffithii* among its nearest allies cfr. *A. scandens*; here I will, moreover, remark, that *A. Griffithii* also shows resemblance with *A. villosum* and other species with bifid style, by the form and indumentum of the leaves, and by the mode of ramification.

Marlea Griffithii CLARKE, in HOOK.F., Fl. Br. Ind., 2, p. 742 (1879); *Karangolum Griffithii* KUNTZE, Rev. gen. pl., 1, p. 273 (1891); *Alangium Griffithii* HARMS, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 262 (1898); WANGERIN, in ENGL., Jahrb., 38, Beibl. 86, p. 61—65 (1906); *Marlea densiflora* KOORD. & VALET., Bull. Inst. Bot. Buitenz., 2, p. 2 (1899); Bijdr. Booms. Java, 5, p. 84 (1900); KOORD., Nat. Tijdschr. Ned. Ind., 60, p. 380 (1901); JANSSON., in MOLL & JANSS., Mikrogr., 3, p. 695, 716 (1918); *Alangium uniloculare* (non *Marlea unilocularis* GRIFFITH, 1854!) KING, Journ. As. Soc. Beng., 71, II, p. 77 (1902); WANGERIN, in ENGL., Pflanzenr., IV, 220b, p. 15 (1910); RIDL., Fl. Mal. Pen., 1, p. 894 (1922); BAKER, Journ. Bot., 62, suppl., p. 45 (1924); CRAIB, Fl. siam. enum., 1, p. 808 (1931); *Alangium myrianthum* WANGERIN, in ENGL., Jahrb., 38, Beih. 86, p. 62, 65, 67 (1906); in FEDDE, Repert., 4, p. 339 (1907); in ENGL., Pflanzenr., IV, 220b, p. 17 (1910); KOORD., Exkursionsfl., 2, p. 733 (1912); *Alangium densiflorum* WANGERIN, in ENGL., Pflanzenr., IV, 220b, p. 17, ic. 4, A—E (1910); KOORD., Exkursionsfl. Java, 2, p. 731, 733 (1912); KOORD.-SCHUM., Syst. Verz., 1, fam. 229, p. 102 (1912); KOORD. & VALET., Atlas, 1, t. 188 (1913); DOCT. V. L., Zoocec. Neth. Ind., p. 438 (1926).

As CLARKE did not elucidate, why he called this species *Marlea Griffithii* it is generally accepted, that the oldest name for it is *Marlea unilocularis* GRIFFITH. The latter name, however, is an obscure one. In GRIFFITH's Icones, 4, t. 639, there is a *Marlea begonifolia*, clearly representing *Alangium chinense*. There is a reference to Notulae 3, p. 679, but on this place we find no *Alangium* at all. In Notulae 4, however, on the same page, we find a *Marlea unilocularis*, with description. It is not impossible, that this description really represents our species, but there are some objections, and for the rest the supposition cannot be proved. These objections are: 1°. that in the description the style is called pubescent, 2°. that the reference from the plate to the description possibly bears on the description of *M. unilocularis*, and in that case *M. unilocularis* would be synonymous with our *A. chinense*

Malay Peninsula. Perak: 90—150 m el., King's coll. 8281 (BD); Upper Perak, 90 m el., Wray 3486 (E, S); Assam Kumbong, plains, Wray 2927 (S); Larut, 60—240 m el., King's coll. 3329 (BM, L), 3593 (B, L), 5824 (K); Ulu Bubong, 120—180 m el., King's coll. 10183 (K, L); Gopeng, King's coll. 563 (BD, K); Pahang: 8 miles S. of Kuala Lipis, Burkill & Haniff 17069 (B, K, S); Tembeling, Henderson 24546 (B, S); Rumpin, Lambah 2720 (K, S) v.n.: *piane*; Selangor: Kuala Lumpur, Weld Hill Reserve, Hashim 493 (S); Cubitt's coll. 889 (S), v.n.: *salang rusa*; Burn Murdoch 14152 (BM, L); Omar 8538 (K, S), v.n.: *salang rusa*; Sungei Buloh Forest Reserve, Abu 6505 (S), v.n.: *salang rusa*, Abu 2297 (K, S), v.n.: *tenyual lawat*; Kepong Selangor, Sow & Tachou 16446 (S), v.n.: *salang rusa*; Symington 21051 (S); Ampang Road, Majid Peon 11622 (S), v.n.: *salang rusa*; Malacca: Maingay, Kew distr. 708 (K); Griffith, Kew distr. 3387 (K); Johore: Bukit Patani, Batu Pahat, Ridley 11095 (S); Kluang, Holttum 9310 (B, BM, K, S); Singapore: Bukit Timah, Ridley 4578 (BM, K, S); Sungei Buloh, Ridley s.n. (S).

Sumatra. Asahan, forest reserve Masihi, Krukoff 4243 (NY); Palembang, Tandjong Ning, Forbes 2812 (L), 2813 (BD, L); Tandjong Ning, R. Bliti, 180 m el., Forbes 2739 (BM, L, S); Lampongs, G. Raté, Telanggoran, 400 m el., Iboet 39 (B, BD, K, L).

Borneo. Sarawak, Upper Rejang River, Kapit, low el., Clemens 21049 (B, NY, Sa); E. Borneo, near the northern frontier, Tikoeng, Amdjah 807 (B, L, UC).

Java. Palaboehanratoe, Koorders tree no. 1330a, herb. no. 33038β (B), 15691 β (B, BD, K, L) first type of *Marlea densiflora* Koord. & Valet.; Ragadjampi, near Banjoewangi, forest Sebanen, Koorders tree no. 7922w, herb. no. 10073 β (B, L), 39303 β (B, L), 28897 β (B, K, L), 13191 β (B), second type of *Marlea densiflora* Koord. & Valet., wrongly cited Kds. 31191β by Koord. & Val. l. c.; forest near Genteng, for. no. 1706*, herb. no. 20998 β (B); near Kp. Kaligoeng, Koorders for. no. 1121*, herb. no. 28895 β (B, L); Blimbangan, Zollinger 3907 (W, type of *Alangium myrianthum* Wanger.).

Selebes. Subdiv. Malili, near Kampong Kawata, alt. 250 m, Boschpr. Cel. V, 128 (B), v.n.: *manata*.

Halmahéra. Soa Tobaroe, 60 m el., Beguin 1977 (B), v.n.: *dodaara*.

Séran. Wai Kawa (NW. Séran), 100—200 m el., Rutten 1831 (B, L, U).

Further distribution: Siam.

Section III. *Stamens as many as petals and calyx teeth. Style cylindrical, deeply divided into 2 long branches stigmatose at the inside. Endosperm smooth. Radicle shorter than half the length of the cotyledons.* Species 9—11. **Fig. 3.** — Twigs monopodial, branching from the axils of the last vegetation period. Leaves entirely penninervous. Inflorescences with distinct peduncle, branches and pedicels, but with little developed bracts. Style glabrous or hairy. Ovary one-celled. Fruit and seed slightly flattened.

9. **Alangium villosum** (Blume) Wangerin — *Internodes* between the adult leaves 0.8—6 cm long, 0.75—5.5 mm thick, thin-tomentose to hirsute-tomentose. *Petioles* 3—13 mm long, hairy like the twigs; lamina ovate-oblong to lanceolate, rarely somewhat obovate, asymmetrical, 4—19 cm long, 1.5—7.5 cm broad, usually cuneate at the base or the broader side rounded, more or less acuminate towards the acute or obtuse apex, chartaceous, penninervous, with 5—10 lateral nerves at each side of the midrib, glabrous or sparingly hairy on the upper side except on the midrib tomentose in the basal portion, hirsute-tomentose on the lower

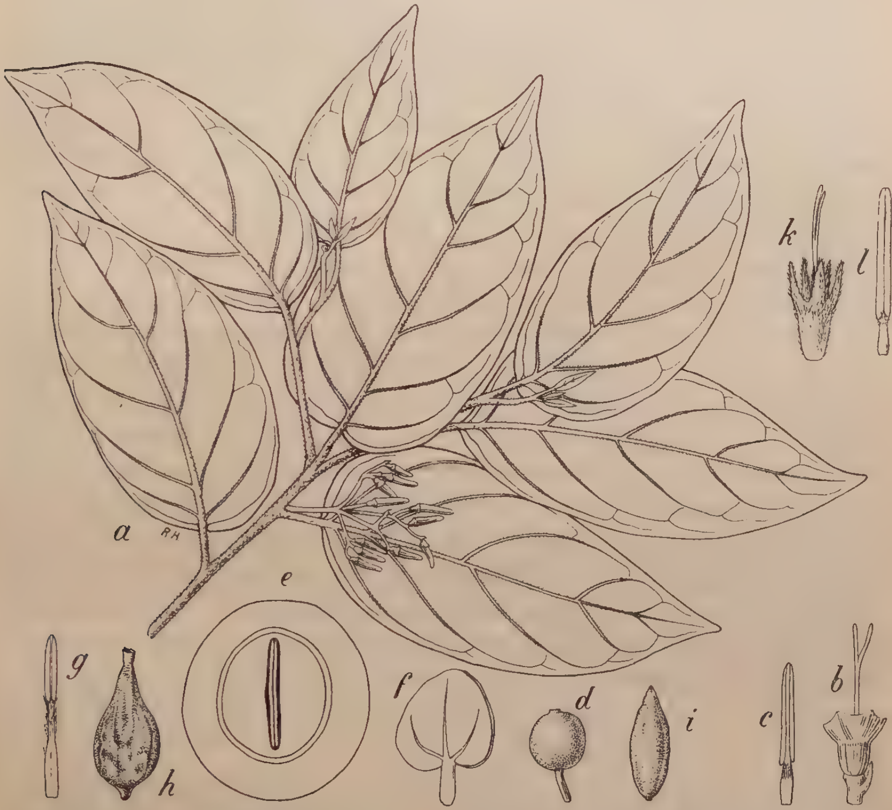

Fig. 3: *Alangium* sect. III. **a—f**: *A. villosum* var. *tomentosum*; **a**: twig fragment with leaves and inflorescences, $^3/_5$ ×; **b**: calyx with pistill, $2^1/_2$ ×; **c**: stamen, $2^1/_2$ ×; **d**: fruit, $^3/_5$ ×; **e**: transverse section of the fruit, $2^1/_2$ ×; **f**: embryo, $2^1/_2$ ×; **g—h**: *A. ferrugineum*; **g**: stamen, $2^1/_2$ ×; **h**: fruit, $^3/_5$ ×; **i—l**: *A. Warburgianum*; **i**: fruit, $^3/_5$ ×; **k**: calyx with pistill, $2^1/_2$ ×; **l**: stamen, $2^1/_2$ ×; **a** after Koorders 38191 β, **b**, **c**, after Koorders 38376β, **d**, **e**, **f**, after Koorders 28896β, **g**, **h**, after Brass 1066, **i**, **k**, **l**, after Warburg 18116.

surface, especially on the nerves and veins. — *Inflorescence* hirsute-tomentose, 2—4 × branched, 2—30-flowered, 6—55 mm long (flowers excluded), the peduncle 3—25 mm long, the pedicels 0—6 mm long; bracts oblong to filiformous, 0.25—3 mm long, 0.5—0.6 mm broad. *Flowers* 4—7-usually 5-merous, 8.5—12 mm long; calyx tube tomentose, campanulate, 1.5—2 mm long, limb cupuliformous-infundibuliformous, 0.5—0.75 mm long, 1.75 mm wide, with teeth 0.2—0.5 mm long; corolla-bud subcylindrical, 1—2 mm thick ,thickened in the basal part to 2.5 mm, also slightly swollen in the upper portion, obtuse; petals 7—10 mm long, tomentose outside, inside tomentose in the basal dilate portion, nearly glabrous or sparingly hairy for the rest; stamens as many as petals, 5.5—9 mm long, filaments 2—3.5 mm long, with a basal portion 1.5—2.5 mm long, 0.75—1 mm broad, flattened and bearded inside at the top, and an upper portion 0—1 mm long, 0.5 mm broad, glabrous; anther 3.5—5.5 mm long, 0.5 mm broad, with glabrous connective; style glabrous, 3.5—5.5 mm long, 0.3—0.5 mm thick; stigma entirely split into 2 acute lobes curved outward 1.5—3 mm long; disc 4—7-angular, 0.25 mm high, 0.8—1.5 mm in diameter; ovary one-celled. *Fruit* in the dry state ellipsoidal to globose, sometimes flattened, rounded at the base and the apex, 10—17 mm long (incl. calyx limb), 7—10 mm broad, 6—8 mm thick, glabrous or short-hairy, with 8—12 superficial grooves, crowned by the calyx limb 0.75—1 mm high and 0.5—2 mm wide and the non-exserted disc, in alcohol materials 12 mm long, 11 mm in diameter, not grooved. (Description after all the materials mentioned below, with exception of the flowers of the var. *parviflorum* not known in the opened state, but probably smaller than those of the var.s *salaccense* and *tomentosum*). **Cfr. fig. 3, a—f.**

According to the notes on herbarium labels *A. villosum* is a tree up to 17 m high and with a trunk up to 40 cm in diameter, with greenish- or yellowish-white corolla and style, white stamens and dark-red fruit. It occurs at an altitude of 5 to 1400 m, and flowers from August to November (end of the dry season).

A. villosum has been collected only in a few localities in western and eastern Java and in Flores. It is peculiar that the specimens from western Java are rather strongly different from those from eastern Java, and these again from those from Flores. I agree with KOORDERS en VALETON, who consider all the Java specimens to belong to one species, as the flowers are hardly different; the main differences are in the foliage and in the number of flowers in the inflorescences. The specimens from eastern Java are hardly different from the Australian *A. vitiense*

(GRAY) HARMS var. *tomentosum* BENTH., and I suppose that also *A. ferrugineum* C. T. WHITE, *A. vitiense* (GRAY) HARMS, *A. pilosum* MERRILL, and *A. Bussyanum* (BAILLON) HARMS, and perhaps even *A. Warburgianum* WANGERIN, are only varieties of the same species. It is therefore that also the Timor form, of which no open flowers are known, but that closely resembles *A. pilosum* MERRILL, is taken by me as a variety of *A. villosum*.

Styrax villosum BLUME, Bijdr., 13, p. 671 (1825) α; A. DE C., in D. C., Prodr., 8, p. 268 (1844) α; ZOLLING., Syst. Verz. 1842—1848, Heft 2, p. 135 (1854—1855) α; MIQUEL, Fl. Ind. Bat., I, 2, p. 464 (1859) α; KURZ, in Journ. As. Soc. Beng., 40, II, p. 61 (1871) α; BOERL., Hand. Fl. Ned. Ind., 2, p. 232 (1891) α; GRESHOFF, Schetsen, p. 118 (1896) α; KOORD. & VAL., Bijdr. booms. Java, 7, p. 131 (1900) α; PERKINS, in ENGL., Jahrb., 31, p. 484 (1902) α; in Engl., Pflanzenr.., IV, 241, p. 85 (1907) α; VAN STEENIS, in Bull. Jard. Bot. Buitenz., ser. III, 12, p. 253 (1932) α; *Pseudalangium polyosmoides* var. *tomentosum* F. v. MUELL., Fragmenta, 2, p. 85 (1860—61); *Alangium Zollingeri* BAILLON, Adansonia, 5, p. 195 (1864—65) β; HARMS, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 261 (1898) β; WANGERIN, in ENGL., Bot. Jahrb., 38, Beibl. 86, p. 63 (1906) β; *Marlea vitiensis* var. *tomentosa* BENTH., Fl. austr., 3, p. 386 (1866) β; BAILEY, Queensl. Fl., 2, p. 737 (1909) prob. β; KOORD. & VAL., Bijdr. Booms. Java, 5, p. 73 (1900) β, cum fm. *salaccensis*, α; BAILEY, Compr. Cat. Queensl. Pl., p. 236, 238, ic. 203 (1909) prob. β; JANSSON, in MOLL & JANSS., Mikrogr., 3, p. 695, 709 (1918) β; *Marlea villosa* KURZ, in Journ. As. Soc. Beng., 40, II, p. 61 (1871) α; in Flora, 54, p. 304 (1871) α; in Nat. Tijdschr. Ned. Ind., 34, p. 107 (1874) α; *Karangolum Zollingeri* KUNTZE, Rev. gen. pl., 1, p. 273 (1891) β, *Alangium villosum* WANGERIN, in ENGL., Jahrb., 38, Beibl. 86, p. 61 (1906) α; in ENGL., Pflanzenr., IV, 220b, p. 18 (1910) α; KOORD., Exkursionsfl. Java, 2, p. 733 (1912) α, β; KOORD.-SCHUM., Syst. Verz., 1, fam. 229, p. 103 (1912) α, β; KOORD. & VALET., Atlas, 1, p. 186 (1913) β; *Alangium vitiense* var. *tomentosum* WANGERIN, in ENGL., Bot. Jahrb., 38, Beibl. 86, p. 63 (1906) β; in ENGL., Pflanzenr., IV, 220b, p. 19 (1910) β; DOMIN, in Bibl. bot., 22, p. 999 (1921) prob. β; *Alangium vitiense* KOORD., Exkursionsfl. Java, 2, p. 731 (1912) α, β.

Var. **salaccense** (KOORD. & VALET.) BLOEMB., nov. comb. — Internodes between the adult leaves 0.75—4.5 cm thick, 0.8—8.5 cm long. Petioles 3—8 mm long; laminae oblong to lanceolate, 4—14 cm long, 1.5—6 cm broad, cuneate at the base or rounded at the broader side. Inflorescences once to twice branched, 2—5-flowered, 6—19 mm long, with peduncle 3—7 mm long and pedicels 1.5—4 mm long; bracts oblong to triangular, 1.5—3 mm long, 0.5—0.6 mm broad. Flowers 8.5—12 mm long.

For the synonyms cfr. those marked with α in the general list.

JAVA. Without exact locality, but very probably W. Java; coll. unknown, s.n. (B, BD, L, NY) v.n.: *kitamieang, kitamiang*; 900—1800 m alt., JUNGHUHN s.n. (L) v.n.: *anjereh*; ZOLLINGER 785 Z. (BD); Priangan, NAGEL 226 (BD); West-Java, 900—1800 m alt., JUNGHUHN s.n. (L) v.n.: *kilalayoe*; G. Gedé, ,,houtsoorten van den Gedeh 175'' (L) v.n.: *kilalayoe*; G. Salak, or cultivated in the Buitenzorg Botanic Garden, BLUME s.n. (L, U, at least partly originals of *Styrax villosum* BLUME).

Var. **tomentosum** (F. v. MUELL.) BLOEMB., nov. comb. — Internodes between the adult leaves 2.5—5.5 mm thick, 2—6 cm long. Petioles 6—

13 mm long; laminae ovate-oblong to lanceolate, cuneate at the narrower side of the base, rounded at the broader side, 6.5—19 cm long, 2.8—7.5 cm broad. Inflorescences 3—4 × branched, 9—30-flowered, 14—55 mm long, the peduncle 8—25 mm long, the pedicels 0—6 mm long, the bracts triangular to obovate, 0.25—3 mm long, 0.5 mm broad. Flowers 8.5—12 mm long.

Java. Gerbo (Pasoeroean), 750 m alt., Mousset 1075 (B, L); G. Ardjoena, 1400 m alt., Koorders for. no. 2271*, herb. no. 38191 β (B, L); forest Tjoeramanis (Simpolan near Djember), Koorders for. no. 4035w, herb. no. 10038 β (B) v.n.: *tandjong goenoeng*, 38497 β (B), 40054 β (B); for.no. 4178w, herb. no. 10050 β (B) v.n.: *roekdjeroekan*, 21103 β (B), 38376 β (B, L), 39954 β (B); for. no. 4187w, herb. no. 10051 β (B), v.n.: *gumbir*, 21100 β (B), 28757 β (B, L); for. no. 4217w, herb. no. 20747 β (B), 30343 β (B, L), 38429 β (B), 40076 β (B); for. no. 4229w, herb. no. 10057 β (B), v.n.: *kodjoek*, 10059 β (B), 20748 β (B), 38425 β (B), 40075 β (B), for. no. 4271w, herb. no. 3766 β (B) v.n.: *kasidjan*, 10061 β (B), 21044 β (B, L), 21101 β (B), 30885 β (B, L), for. no. 4297w, herb. no. 3767 β (B), v.n.: *kosang*; forest Pantjoer Idjen (near Sitoebondo, Besoeki), 1000 m el., Koorders 14387 β (B, L), for. no. 4191t, herb. no. 14388 β (B, L), 28511 β (B, L), for. no. 4206t, herb. no. 14385 β (B, L), 14639 β (B), for. no. 4219t, herb. no. 14640 β (B, BD, L), 14902 β (B, K, L); forest Noesabarong, near Djember, Koorders 10087 β (B, BD, L); forest Ragadjampi Balak (near Banjoewangi), Koorders for. no. 7844w, herb. no. 8585 β (B), v.n.: *koeniran*, 8586 β (B) v.n.: *koeniran*, 8587 β (B, L), 38896 β (B, L), for. no. 7926*, herb. no. 8534 β (B, L), v.n.: *koeniran*; forest Ragadjampi Balak, near Kp. Kali-goeng-gintongan, Koorders 8535 β (B); for. no. 1120*, herb. no. 28896 β (B, BD, K, L, U), v.n.: *koeniran*; Moentjar (S.E. Besoeki), alt. 5 m, Becking 56 (B), v.n.: *koeniran*.

Further distribution: eastern Australia.

Var. **parviflorum** Bloemb., n. var. — Internodia inter folia adulta 1—3 mm crassa, 6—45 mm longa. Petioli 5—8 mm longi; laminae ovato-oblongae, 6.5—10 cm longae, 2.8—3.2 cm latae, basi utrinque cuneatae sed latere latiore magis rotundatae. Inflorescentiae 2—3 × ramosae, 11—16-florae, 12—17 mm longae, pedunculo 3—7 mm longo, pedicellis 1.5—2.5 mm longis. Flores statu alabastri nondum adulti tantum noti, 3—3.5 mm longi.

Flores. Kp. Boehe Sogo (Maoemere), alt. 250 m, Boschpr.bb. 11370 (B, type), v.n.: *lalimera*, tree, 22 m high, its bole 14 m high, 38 cm diam., 7 II 1927.

With this the following materials without flowers nor fruit look entirely identical: Flores, Manggarai, near Wailako, alt. 10 m, Boschpr.bb. 14,352 (B), v.n.: *woenis*.

10. Alangium ferrugineum C. T. White — *Internodes* between the adult leaves 2—3.5 cm long, 2—3.5 mm thick, densely and shortly hirsute-tomentose, nearly velutinous. *Petiole* 8—10 mm long, hairy like the twigs; lamina ovate-oblong to oblong, asymmetrical, 10.5—17.5 cm long, 3.8—7 cm broad, cuneate on one side, rounded on the other side at the base, rather strongly acuminate towards the acute apex, chartaceous, penninervous with 4—7 lateral nerves at each side of midrib, glabrous above with exception of the appressedly hairy basal part of the midrib, the nerves and veins beneath hairy like the petiole, but less densely and the hairs shorter. *Inflorescence* and calyces velutinous like the twigs, 2—3 × branched, 8—15-flowered, 20—25 mm long (flowers excluded), the peduncle 12—21 mm long, the pedicels 1—5 mm long; bracts triangular to lanceolate, 0.5—2.25 mm long, 0.5—0.75 mm broad. *Flowers* usually 5-merous, 15—16 mm long; calyx tube nearly cylindrical or somewhat infundibuliformous, 2.5 mm long, the limb nearly erect, slightly campanulate-infundibuliformous, 2 mm long, 2.25—2.5 mm wide, with teeth 0.4 mm long; adult corolla in bud subcylindrical, slightly clavate, obtuse, nearly 1.5 mm thick in the basal portion, 3 mm in the upper portion; petals nearly 14 mm long, densely sericeous-villose outside, glabrous inside; stamens as many as petals, 8—8.5 mm long; filaments nearly 5 mm long, flattened, with a basal portion 3 mm long, 0.5 mm broad, bearing few sericeous hairs inside at the apex, and an upper portion 2 mm long, 0.25—0.3 mm broad, entirely sericeous-pilose, but the hairs on the inside longer than on the outside; anther 3—3.5 mm long, 0.3—0.4 mm broad, with glabrous connective; style 7 mm long, 0.3—0.4 mm thick, sparingly sericeous-hairy, especially towards the apex; stigma entirely divided into 2 linear obtuse lobes 3—4 mm long and curled outward; disc forming a flat and narrow ring around the style base, 0.3 mm high, 0.75 mm in diameter; ovary one-celled. *Fruit* in the dry state oblong-ovate, slightly flattened, very shortly contracted at the base, long-conical towards the apex, 30—31.5 mm long, 12—14 mm broad, 8—10 mm thick, hirsute-tomentose, glabrescent, with about 10 superficial ribs, crowned by the persistent calyx limb 2.5 mm high and 3 mm wide, and the non-exserted disc. (Description after the materials mentioned below). **Cfr. ic. 3, g—h.**

Alangium ferrugineum C. T. WHITE, Journ. Arn. Arbor., 10, p. 248 (1929).

Closely allied to *Alangium villosum*, of which it perhaps is a variety. Cfr. also the determination key and the discussion of *Alangium villosum*.

NEW GUINEA. South-eastern Part (Papua), Vailala River, Aroara, 60 m el., in rain forest, BRASS 1066 (Br, type), handsome tree, 7.5 m high, leaves dark and glossy above, flowers white, fruit yellow, cylindrical.

11. Alangium Warburgianum WANGERIN — *Internodes* between the adult leaves 1—5 cm long, 1.5—3 mm thick, more or less densely appressedly pilose, glabrescent. *Petiole* 9—13 mm long, rather densely appressedly pilose; lamina usually obovate-lanceolate, more rarely oblong or lanceolate, nearly symmetrical, 6.5—17 cm long, 2.2—5.8 cm broad, cuneate at the base, rather abruptly acuminate towards the obtuse apex, chartaceous, glabrous above, appressedly pilose on the thickest nerves below, penninervous with 6—8 lateral nerves at each side of the midrib. *Inflorescence* densely appressedly sericeous-pilose, almost tomentose, 1—2 × branched, 3—5-flowered, 12—18 mm long (flowers excluded); peduncle 3.5—9 mm long, pedicels 4—7 mm long; bracts triangular to filiformous, 0.25—1.5 mm long, 0.25—0.5 mm broad. *Flowers* 5-merous, 7.75—12 mm long; calyx densely appressedly pilose, the tube campanulate, 1.75—2 mm long, the limb cupuliformous, 1 mm long, 2 mm wide, with 5 lingulate teeth 1.5 mm long, obtuse; corolla in bud cylindrical 0.5—1.5 mm thick, obtuse; petals 6—10 mm long, appressedly sericeous-pilose outside, with few hairs on the midrib inside; stamens as many as petals, 5—9 mm long; filament 1.75—2.75 mm long, with a lower portion 1.5—2.25 mm long, 0.05 mm broad, pilose inside at the apex and along the margins, sparingly hairy outside, and an upper portion 0.25—0.5 mm long, glabrous; anther 3.75—6.75 mm long, 0.75 mm broad, with glabrous connective; style with few soft hairs in longitudinal stripes, 3—7 mm long, 0.25—0.5 mm thick; stigma 3.5 mm long, entirely split into 2 acute lobes curved outward, disc 0.25 mm high, 0.75 mm in diameter; ovary one-celled. *Fruit* in the dry state oviformous-ellipsoidal, acute at the base, more acute at the apex, 17—18 mm long (incl. the calyx limb), 6.5—7 mm broad, 6—6.5 mm thick, glabrous or hairy, with 10 very superficial ribs, crowned by the permanent and slightly enlarged calyx limb 1 mm long 1.75 mm wide, with lobes 1.5 mm long and connivate. (Description after the materials mentioned below). **Cfr. fig. 3, i—l.**

Though, by the bifid stigma, this species belongs to the allies of *A. villosum,* it is strikingly different from it by its large calyx lobes and appressed, almost setose indumentum.

Alangium Warburgianum WANGERIN, in ENGL., Pflanzenr., IV, 220b, p. 18 (1910).

MOLUCCAS. Batjan, G. Sibéla, 750—1200 m alt., WARBURG 18116 (BD, type).

Section IV. *Stamens as many as petals and calyx teeth. Style subcylindrical or gradually thicker from the base to the apex, stigma obtuse-conical with 4 longitudinal stigmatose stripes. Endosperm smooth. Radicle much shorter than half the length of the cotyledons.* Species 12—15. **Fig. 4 & 5.** — Twigs monopodial, branching from the axils of the last (sp. 13—15) or the former (sp. 12) vegetation period. Leaves entirely penninervous (sp. 13—15) or palminervous at the base (sp. 12), nearly symmetrical, roundish (spec. 12) to obovate-lanceolate (sp. 13—15). Inflorescence either sessile, with few long primary branches and the further branches and pedicels very short, or with only one branch and in that case apparently long-peduncled. Bracts more (sp. 14—15) or less (sp. 12—13) developed. Ovary one-celled. Fruit and seed strongly flattened.

12. **Alangium nobile** (Clarke) Harms — *Internodes* between the adult leaves 1—3.8 cm long, 4—8 mm thick, densely hirsute-tomentose. *Petiole* 14—50 mm long, densely hirsute-tomentose; lamina usually roundly-obovate to oblong-obovate, little asymmetrical, 5—30 cm long, 4—16.5 cm broad, rounded to cordate at the base, usually rounded to obtuse at the apex, more rarely acute or shortly acuminate, its upper surface appressedly hirsute-tomentose on the midrib, glabrous for the rest, its lower surface hirsute-tomentose on the thicker nerves, with more scattered spreading hairs on the finer nerves and veins, coriaceous, 3—9-plinervous at the base, moreover with 7—11 lateral nerves at each side of the midrib. *Inflorescence* densely and thickly hirsute-tomentose, 1—2 × branched, 3—19-flowered, 1.6—4 cm long, with a common peduncle or, in absence of such, with primary branches 2—30 mm long; pedicels 0—2 mm long; bracts triangular, 0.75—5 mm long, 1.25—2 mm broad. *Flowers* 6—7- usually 7-merous, 15—22.5 mm long; calyx densely hirsute-tomentose, almost woolly; tube campanulate 2—2.5 mm long, limb cupuli-

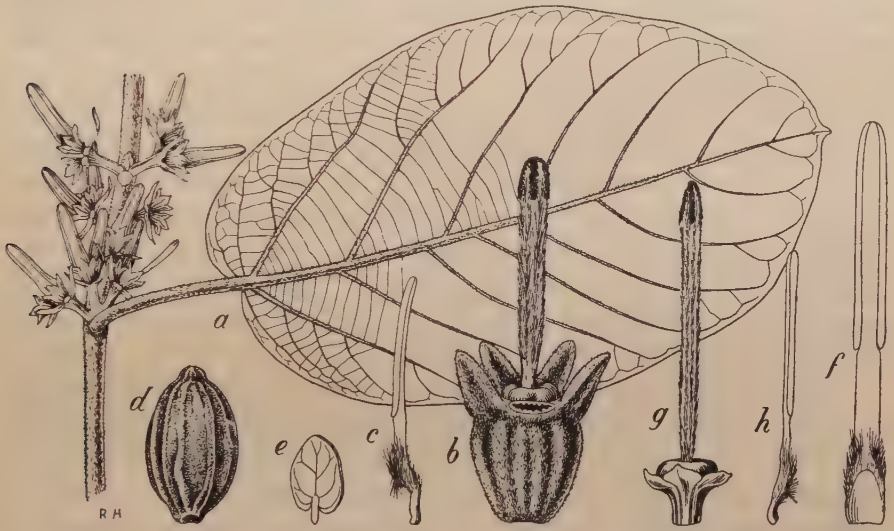

Fig. 4: *Alangium* sect. IV. **a—e**: *A. nobile*; **a**: twig fragment with leaf and inflorescence, $^3/_5$ ×; **b**: calyx with pistill, one calyx teeth cut away, $2^1/_2$ ×; **c**: stamen, $2^1/_2$ ×; **d**: fruit, $^3/_5$ ×; **e**: embryo, $^3/_5$ ×; **f**: *A. nobile* var. *denudatum*, stamen, $2^1/_2$ ×; **g—h**: *A. Havilandii*; **g**: calyx with pistill, $2^1/_2$ ×; **h**: stamen, $2^1/_2$ ×; **a, b, c, d, e,** after Long 3047, **f** after Beguin 582, **g, h,** after Haviland 3019.

formous 1.5—1.75 mm long and 4—6 mm wide, with teeth 1.5—3.25 mm long; corolla in bud subcylindrical 3—4 mm thick, swollen 4—6.5 mm thick in the basal portion, slightly swollen in the middle of the upper one-half; petals 13—20 mm long, rather densely hirsute-tomentose outside, also densely shortly hairy inside in the upper one-half of the dilate portion and on the midrib; stamens as many as petals, 12—19 mm long; filament 4—7 mm long, with a lower portion 2.5—5 mm long, 1—1.5 mm broad, thickened and bearded at the top inside, tomentose along the margins and on the back, and an upper portion 1.5—3.5 mm long, 0.75 mm broad, glabrous; anther 8—13 mm long, 0.75 mm broad, with glabrous connective; style entirely pilose, 7—12 mm long, nearly 1.2 mm thick at the base, 1.75—2 mm at the apex; stigma conical, 3.75 mm long, 1.75—2 mm broad at the base; disc 6—7-lobed, 1.5 mm high, 5.75 mm in diameter; ovary one-celled. *Fruit* in the dry state ellipsoidal-oviformous, flattened, acute at the base, more acute towards the apex, 26—32 mm long (calyx included), 15—20 mm broad, 10—16 mm thick, tomentose, more or less deeply grooved with 12—14 grooves, crowned by the persistent calyx limb with connivate teeth and the nonexserted disc. (Description after all the materials mentioned below, with exception of the var. *denudatum* and the Borneo specimens). **Cfr. fig. 4, a—f.**

According to notes on the herbarium labels *A. nobile* is a tree 20—30 m high, with a bole 40—90 cm in diameter in the lower portion. The flowers are fragrant, the corolla white or brownish-white, the stamens white, the pollen yellow, style and stigma light-yellowish-brown. The species occurs at altitudes from 75 to 330 m and flowers from March to May.

Marlea nobilis CLARKE, in HOOK.F., Fl. Br. Ind., 2, p. 743 (1879); SERTOR., in Bull. Herb. Boiss., 1, p. 474—615 (1893); RIDLEY, in Agr. Bull. Straits & Fed. Mal. St., 1, p. 181 (1902); in Bull. Kon. Mus. Haarlem, 27, p. 72 (1903); *Karangolum nobile* KUNTZE, Rev. gen. pl,. 1, p. 273 (1891); *Alangium nobile* HARMS, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 262 (1898); KING, in Journ. As. Soc. Beng., 71, II, p. 79 (1902); WANGERIN, in ENGL., Jahrb., 38, Beibl. 86, p. 61—68 (1906); in ENGL., Pflanzenr., IV, 220b, p. 11 (1910); HEYNE, Nutt. pl. Ned. Ind., ed. 1, 3, p. 402 (1917); RIDLEY, Fl. Mal. Pen., 1, p. 892 (1922); HEYNE, Nutt. pl. Ned. Ind., ed. 2, 2, p. 1217 (1927).

Var. **denudatum** BLOEMB., nov.var. — *Ramuli,* petioli, nervorum facies inferior et inflorescentiae tenuiter breviterque tomentosi. Internodia inter folia adulta 2.5—6 mm crassa; petiolus 5—10 mm longus; lamina 4.2—14 cm longa, 2.2—6.2 cm lata, basi 5—7-plinervis, superea nervis lateralibus 9—11 utrinque. Flos 27 mm longus; calycis dentes c. 1 mm longi; stamen 21.75 mm longum, filamento 10.25 mm longo, parte inferiore 4.5—5 mm longa, 1.25—2.25 mm lata, latere interiore apice barbata, latere exteriore dense pilosa, et parte superiore 5—6 mm longa, 1—1.5 mm lata, glabra. Fructus ignotus.

The var. *denudatum* is, on one hand, too little different from *A. nobile* to base a new species on it, the more as the fruit are unknown. On the other hand it is too much different to be taken up in the description of the species, as the latter is intended to express the characters of a rather rich and very uniformous material. These differences are a more scanty indumentum, longer flowers, and stronger developed filaments which show a larger difference between the lower and the upper portion than any other *Alangium*. For the same reason the characters of the Borneo specimens (BECCARI P.B. 2477, 2927, & 3611) are not taken up in the description. Especially the number BECCARI 2477 is aberrant by thinner twigs, more chartaceous laminae, and a much more scanty indumentum. The general appearance, the fruit entirely agreeing with that of *A. nobile*, and the other BECCARI numbers from Borneo being more or less intermediate between the number 2477 and normal *A. nobile*, kept me back from distinguishing the latter number as a variety or uniting it with the var. *denudatum*, with which it certainly shows resemblance.

MALAY PENINSULA. Penang: road to Highlands, 300 m alt., CURTIS 1505 (S); Perak: Ulu Kal, 150—210 m alt., KING's coll. 10892 (BM, K, L); Larut, Gopeng, 150—240 m alt., KING's coll. (KUNSTLER) 6116 (B, BD, K), KING's coll. 6047 (K); Selangor: Sg. Buloh Reserve, LONG 3047 (S, K), v.n.: *kalong*; Malacca: GRIFFITH s.n. (BM, K); GRIFFITH (Kew distr.) 3384 (BD, K), 3385 (BD, BM, K), first and second no. cited by CLARKE; MAINGAY 707 (L), third no. cited by CLARKE; Selandor, ALVINS 356 (S), v.n. *pokô sutubal*; Leman, GRIFFITH s.n. (K); Singapore: MAINGAY 705 (BD, L), 4th no. cited by CLARKE; Bukit Timah, GOODENOUGH 5077 (BM, S).

SUMATRA. Palembang: Lematang Hilir, near G. Megang, 75 m alt., BOSCHPR.T. 3. P. 864 (B, L), v.n.: *medang mata oedang*.

BORNEO. Sarawak: BECCARI P.B. 2477 (K), 2927 (K), 3611(K).

Distribution of the var. *denudatum*:

SUMATRA, Bengkalis, Sg. Misigit, 6 m alt., in marshy wood, BEGUIN 582 (B, type, L, U, cotypes), v.n.: *mara lepang*, tree 33 m high, with a trunk 22 m high about 40 cm thick, with stilt roots 2.20 m high, spreading 1.20 m, branches obliquely upward, and cream-white flowers with hyacinth odour, collected flowering in January.

13. **Alangium Havilandii** BLOEMBERGEN, n.sp. — *Internodia* inter folia adulta 0.6—3 cm longa, 1.2—3 mm crassa, tenuiter sed densissime tomentosa. *Petiolus* 5—12 mm longus, tenuiter sed densissime tomentosus; lamina elliptica vel oblonga vel nonnihil ovata, leviter asymmetrica, 5.5—15 cm longa, 3—7 cm lata, basi rotundata vel cuneata, longiuscule acuminata versus apicem obtusum vel acutum, glabra vel nervis facie inferiore tenuiter tomentosis, chartacea, nervis lateralibus utrinque 7—9. *Inflorescentia* tenuiter sed dessissime tomentosa, 1—2 × ramosa, 1—6-flora, pedunculo, vel eo absente, ramis primariis 6—14 mm longis, pedicellis 1.5—3 mm longis; bracteae triangulares 0.5—4 mm longae, 0.5—1 mm latae. *Flores* 4—5-meres, 18—22 mm longi; calyx tenuiter sed densissime tomentosus, tubo campanulato-infundibuliformi, 2 mm longo, limbo cupuliformi 1 mm longo 4 mm lato dentibus 0.75 mm longis;

corolla statu alabastri subcylindracea, 1.5—2.5 mm crassa, parte basali valde inflata ad 5.5 mm diametro; petala 16—20 mm longa, tenuiter sed densissime tomentosa latere exteriore, latere interiore tomentosa in parte basali dilatata (praecipue nervo mediano) et ceterum in nervis 3 parallelis prominentibus; stamina 14—17.5 mm longa, filamentis 6—8 mm longis parte basali 2.5—4.5 mm longa 0.5—1.75 mm lata intus apice barbata, dorso omnino vel marginibus pilosa, et parte superiore 2.5—4 mm longa 0.75 mm lata, glabra, anthera 8.7—9.7 mm longa, 1—1.2 mm lata, obtusa, connectivo glabro; stilus omnis pilosus, 11.5—13 mm longus, basi c. 0.5 mm, apice c. 1.5 mm crassa; stigma conicum, 2.5—3 mm longum, basi 1.5—2 mm diametro; discus 4—5-lobus, 1.2—1.25 mm altus, 2.75—3.5 mm diametro; ovarium uniloculare. *Fructus* ignotus. (Description after all the materials mentioned below). **Cfr. ic. 4, g—h.**

By the characters of the flowers this species is closely allied to *A. nobile,* but it is strongly different by leaves quite different-shaped and entirely penninervous, and the peculiar thin but very dense tomentum. Through the penninervous leaves it comes close to *A. Ridleyi* and *A. javanicum.*

BORNEO. Sarawak: G. Sedilu forest reserve (Sadong), OMAR 00054 (S, type), v.n.: *sisit;* Oya, HAVILAND 3019 (BM, K, S); Baram, HAVILAND & HOSE 3285 (K, Sa).

14. Alangium Ridleyi KING — *Internodes* between the adult leaves 1.8—7.5 cm long, 3—9 mm thick, glabrous. *Petiole* 15—40 mm long, glabrous; lamina obovate-oblong or oblong, rarely broader or more ovate, symmetrical, 8—42 cm long, 5—20 cm broad, rounded to cuneate at the base, more or less (never strongly) acuminate towards the obtuse or acute apex, glabrous, rather thickly coriaceous, penninervous with 10—18 lateral nerves at each side of the midrib. *Inflorescence* glabrous, 1—3 × branched, 6—15-flowered, 4.5—22 mm long (flowers excluded), with a common peduncle or, in absence of such, with primary branches 1.5—6 mm long, 3—4 mm thick, and pedicels 1.5—5 mm long; bracts triangular, 0.5—2 mm long, 0.25—0.5 mm broad. *Flowers* 5—7-, usually 6-merous, 18—27 mm long; calyx glabrous; tube infundibuliformous, 3—4 mm long, limb cupuliformous, 2 mm long, 7 mm wide, teeth 0.25 mm long; corolla in bud subcylindrical (in the herbarium 5—7-angular), 4—7 mm thick, obtuse, hardly swollen in the basal portion; petals 15—23 mm long, glabrous outside, inside from 5—6 mm above the base up to the apex appressedly pilose especially on the nerves; stamens 12—20 mm long, filament 3.5—5 mm long, 2—2.75 mm broad, flattened, glabrous outside, bearded at the apex and sparingly hairy along the margins inside; anther 9—14 mm long, 1.5—1.65 mm broad, with glabrous connective; style

pilose on longitudinal stripes, 7.5—12.5 mm long, nearly 1.25 mm thick at the base, 3.75 mm thick below the stigma; stigma conical, 4.5 mm long, 4 mm broad at the base; disc 5—7-lobed, 2.25 mm high, 4 mm in diameter; ovary one-celled. *Fruit* in the dry state ovate, flattened, rounded or slightly acute at the base, more acute towards the apex, 27—37 mm long (calyx included), 18—22 mm broad, 12—14 mm thick, usually glabrous, with 10—14 obtuse ribs and deep grooves between them, crowned by the 2—3.5 mm long calyx limb and the non-exserted disc, in alcohol materials ellipsoidal, not ovate nor flattened, rounded at the base and at the apex, 32—34 mm long, 18—23 mm in diameter, with more superficial grooves. (Description after all the materials mentioned, the alcohol materials being from tree VII. H. 14 cultivated in the Buitenzorg Botanic Garden). **Cfr. fig. 5, a—i.**

According to notes on herbarium labels *A. Ridleyi* is a tree 16—40 m high, with a bole 25—45 cm in diameter, often with flat and curved stilt-roots 50—160 m high, and with spreading branches. The flowers are very sweet scented, white- or cream-coloured, the filaments and style white, the anthers light-yellow, the stigma orange, the disc yellow, the ripe fruit dark-violet to black, red inside. It occurs from 50 to 200 m altitude, in forests, often in marshy forests, and flowers from April to September (dry season).

A. Ridleyi is closely related to *A. javanicum,* but it seems possible to distinguish it by the form and dimensions of the fruit, which in *A. Ridleyi* is 27—37 mm long, 18—22 mm broad, and 12—14 mm thick, strongly grooved with 10—14 deep grooves and obtuse ribs, in *A. javanicum* 17—35 mm long, 11—17.5 mm broad, 6—12 mm thick, usually not at all, sometimes superficially and irregularly, rarely more strongly grooved with 10—12 obtuse ribs. The fruit of *A. Ridleyi* is always less flattened as that of *A. javanicum.* Moreover there are slight differences in the dimensions of the twigs and the flowers. In *A. Ridleyi* the twigs between the adult leaves are 3—9 mm thick, the flowers are 18—27 mm long and 4—7 mm thick in bud; in *A. javanicum* the twigs between the adult leaves are 1.5—6.5 mm thick, the flowers are 8—25 mm long, and 1.75—5 mm thick in bud. These differences are, however, certainly insufficient for specific distinction. As, moreover, among the materials of *A. javanicum* examined, there are specimens with fruit approaching those of *A. Ridleyi* (ELMER 21750, 21116, BEGUIN 2262, JAHERI s.n.) it is doubtful whether *A. Ridleyi,* too, is not a form of the widely spread and polymorphic *A. javanicum.*

Alangium Ridleyi KING, in Journ. As. Soc. Beng., 71, II, p. 78 (1902);

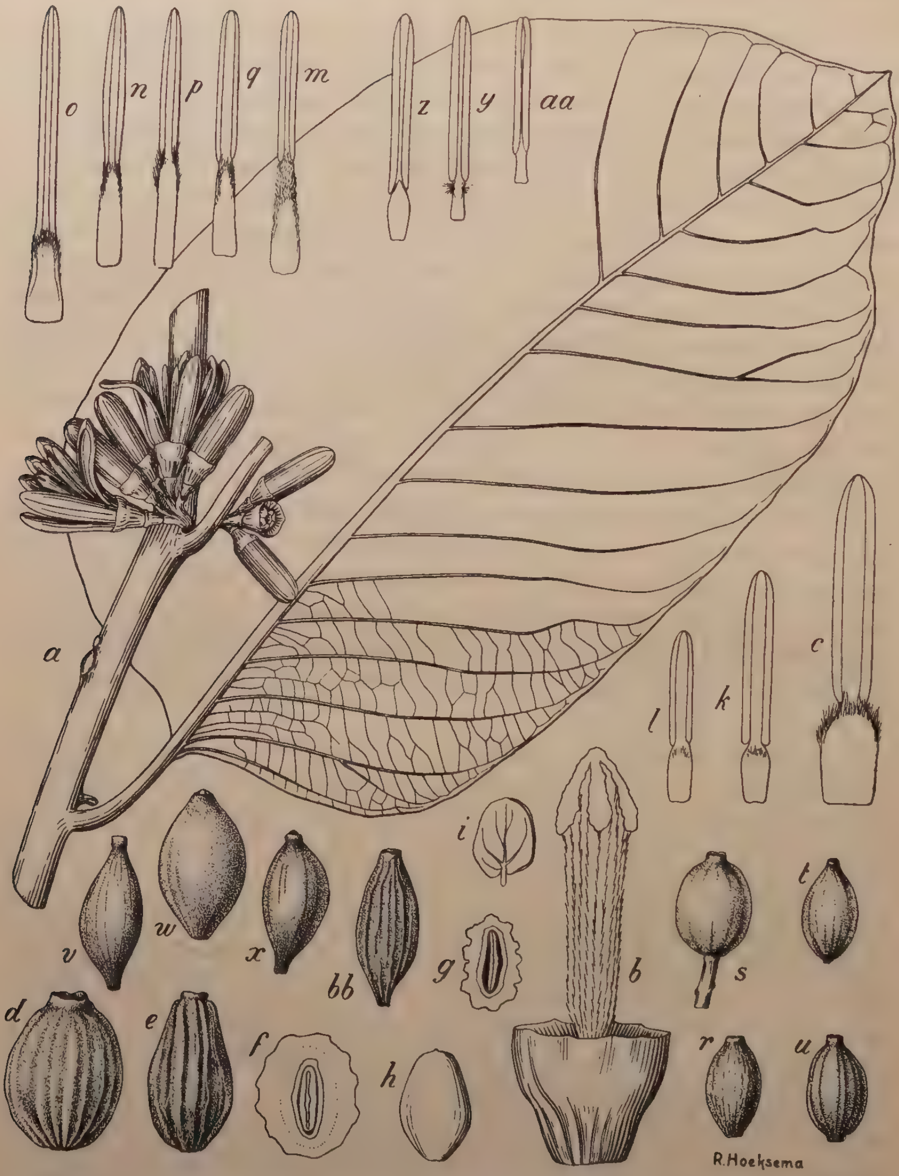

Fig. 5: *Alangium* sect. IV. **a—i**: *A. Ridleyi*; **a**: twig fragment with leaf and inflorescence, $^{3}/_{5}$ ×; **b**: calyx with pistill, $2^{1}/_{2}$ ×; **c**: stamen, $2^{1}/_{2}$ ×; **d**: fruit, alcohol material, $^{3}/_{5}$ ×; **e**: fruit, dry, $^{3}/_{5}$ ×; **f**: fruit, alcohol material, $^{3}/_{5}$ ×; **g**: fruit, dry, $^{3}/_{5}$ ×; **h**: stone, alcohol material, $^{3}/_{5}$ ×; **i**: embryo, alcohol material, $^{3}/_{5}$ ×; **k—v**: *A. javanicum*; **k—q**: stamens, $2^{1}/_{2}$ ×; **r—v**: fruit, $^{3}/_{5}$ ×, only s alcohol material; **w—x**: *A. javanicum* var. *minahassicum*; **w**: fruit, alcohol material, $^{3}/_{5}$ ×; **x**: fruit, dry, $^{3}/_{5}$ ×; **y—aa**: *A. javanicum* var. *papuanum*, stamens, $2^{1}/_{2}$ ×;

WANGER., in ENGL., Pflanzenr., IV, 220b, p. 12 (1910); RIDL., Fl. Mal. Pen., 1, p. 893, ic. 75 (1922); Dispers. of pl., p. 350, 376 (1930); *Marlea costata* (non BOERL., 1890), VALET., in Ic. bogor., 3, p. 267, t. 179 (1906); BOLDINGH, Cat. Herb. Hort. Bogor., p. 145 (1914); *Alangium costatum* WANGER., in ENGL., Pflanzenr., IV, 220b, p. 12, ic. 3, A—E (1910); EVRARD, in LEC., Fl. Indo-Ch., 2, p. 1186 (1923); THORENAAR, in Meded. Proefst. Boschw., 16, p. 102 (1926); DAKKUS, in Bull. Jard. Bot. Buitenz., ser. III, suppl. 1, p. 13 (1930).

MALAY PENINSULA. Wellesley: Tasek Gelugor, CURTIS 3736 (K, S); Perak: Upper Perak, WRAY 3632 (K); Pahang: Benus Valley, Bentong, 180 m alt., BURKILL & HANIFF 16450 (K, S); Tembeling, low el., HENDERSON 21889 (S); Selangor: Kepong, SOW & TACHOU 16425 (S); Malacca: Selandor, ALVINS s.n. (S), v.n.: *kayu lidah karbâu puteh*; Singapore: CANTLEY's coll. s.n.; Botanic Garden jungle, RIDLEY 4941 (BM, K, S) type of *Alangium Ridleyi* KING; *ibidem*, sine coll. nec no. (BD).

SIMEULOEË. ACHMAD 372 (B, L), v.n.: *medang sengeh*; 532 (B), v.n.: *teramajang silai*; 1271 (B, L), v.n.: *kengengit fatoeh*; 1297 (B, L, U), v.n.: *teramajang pajo*; 1428 (B, L, U), v.n.: *temarajang pajo*.

SUMATRA. Simpang Toba (Asahan), 30 m el., BOSCHPR.BB. 7178 (B), v.n.: *babi koeroes*; Masihi Reserve (Asahan), 40 m el., BOSCHPR.BB. 6342 (B), v.n.: *babi koeroes*; Bajoenglintjir (Banjoeasin- en Koeboestreken), 15 m el., BOSCHPR. 160 E. 1. P. 852 (B, L), BOSCHPR. T. 1159 (B, L), BOSCHPR. 1. P.T. 797 (B, L), BOSCHPR. 1. P.T. 789 (B), v.n.: *melepangan pajo*; G. Megang (Lematang Hilir), 75 m el., BOSCHPR. 131. T. 3. P. 369 (B, L), and 160. E. 3. P. T. 369 (B), v.n.: *medang mata oedang*.

BANGKA. Cultivated in the Buitenzorg Botanic Garden from Bangka under VIII. H. 14 & 14a (B, type of *Marlea costata* VALET. non BOERL.) v.n.: *kembel*; under VIII. H. 17 (B, K, L), v.n.: *parak laki*; and under IX. A. 20 & 20a (B).

Also under XI. C. 7a (B) from unknown provenance.

Distribution: Indo-China.

15. **Alangium javanicum** (BLUME) WANGERIN — *Internodes* between the adult leaves 0.5—6.5 cm long, 1.5—6.5 mm thick, glabrous or thin-tomentose or more rarely shortly hirsute-tomentose. *Petiole* 3.5—28 mm long, with indumentum like the twigs; lamina usually obovate-oblong to obovate-lanceolate, more rarely elliptic to oblong, usually symmetrical, rarely slightly asymmetrical, 2.8—32.5 cm long, 1.3—12.3 cm broad, with rounded to cuneate or somewhat contracted base, more or less acuminate towards the usually obtuse apex, rarely protracted into a long acumen, chartaceous to rather thickly coriaceous, usually entirely glabrous, more rarely shortly hirsute-tomentose or puberulous on the nerves below, or even sparingly hairy between the

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bb: *A. javanicum* var. *Jaherii*, fruit, dry, $^3/_5$ ×; **a**, ACHMAD 372, **b**, **c**, BOSCHPR. T. 369, **d**, **e**, **f**, **g**, **h**, **i**, Bot. Gard. Buitenzorg VIII. H. 17, **k**, RIDLEY 13223, **l**, Bot. Gard. Buitenz. VIII. F. 25, **m**, Bot. Gard. Buitenzorg IX. D. 51, **n**, HALLIER B. 1231, **o**, RUTTEN 1832, **p**, HAVILAND 2886, **q**, AGAMA 1022, **r**, HAMID 7562, **s**, **t**, BOSCHPR. 31. T. 1. P. 35, **u**, HALLIER B. 1231, **v**, KLOSS 18963, **w**, **x**, Bot. Gard. Buitenz. IV. F. 99, **y**, LEDERMANN 9818, **z**, LEDERMANN 11534, **aa**, LEDERMANN 8137, **bb**, JAHERI s.n.

nerves, entirely penninervous, with 7—22 lateral nerves at each side of the midrib. *Inflorescence* 1—3 × branched, 1—34-flowered, 2—26 mm long (flowers excluded), with a common peduncle or, by lack of this, with primary branches 1—18 mm long, pedicels 0—7 mm long, bracts triangular 0.25—3 mm long, 0.5—2.25 mm broad. *Flowers* 4—7-merous, usually 6-merous, 10.25—19.5(25) mm long; calyx thin-tomentose to glabrous, the tube infundibuliformous or more campanulate, 1.75—3(5) mm long, the limb infundibuliformous or cupuliformous, rarely spreading, 0.9—3 mm long, 3—6 mm wide, with 0.1—0.75 mm long teeth; corolla in bud subcylindrical, 1.75—5 mm thick, usually somewhat swollen in the basal portion, also slightly in the middle of the upper one-half, obtuse or more rarely acute or shortly acuminate; petals 8.5—16.5(20) mm long, thin-tomentose or more rarely glabrous or hirsute-tomentose outside, sparingly hairy inside especially on the nerves, rarely thin-tomentose or quite glabrous; stamens as many as petals, 8—15.75(19) mm long, filament 2—6.75 mm long, 0.75—2 mm broad, bearded inside at the tip and hairy along the margins, glabrous or sparingly tomentose or pilose outside; anther 6—10(12.5) mm long, 0.7—1.25 mm broad, with glabrous connective; style pilose or tomentose on longitudinal stripes, often glabrous in the basal portion, 4—10(16.5) mm long, 0.6—1 mm thick at the base, 1.3—3.2 mm thick below the stigma; stigma conical with 4 longitudinal stigmatose ribs, 1.4—3.25 mm long, 1—2 mm thick at the base; disc semiglobose, 4—7-angular, or 4—7-lobed, rarely cylindrical, 0.8—2.25 mm high, 1.8—4 mm in diameter; ovary one-celled. *Fruit* ellipsoidal, ovate or slightly rhomboid in the dry state, rounded at the base, acute or rarely slightly acuminate towards the apex, 17—30(35) mm long, 11—15 mm broad, 6—12 mm thick, glabrous or thin-tomentose, usually superficially, more rarely deeper-grooved, crowned by the 1—3 mm long, 3—4.5 mm wide calyx limb and the disc that is exserted or not. (Description after the materials mentioned, with exception of the varieties distinguished, the dimensions between brackets being those of the specimens with unusually long flowers discussed below). **Cfr. fig. 5, k—bb.**

Alangium javanicum, as accepted here, is a widely spread and rather polymorphic species, especially varying in the eastern part of its area. Of the varieties only those have been named, that perhaps have a higher systematic value. Of the other variations may be mentioned, that a part of the North-Borneo and Java materials are more hirsute-tomentose with more brownish indumentum, whereas most other forms have a greyish, thin-tomentose indumentum. A number of North-Borneo specimens described as *A. mezianum* by Wangerin (Haviland & Hose 2885) and as *A. borneense* by Merrill (Agama 1022, Ramos 1451, Kloss 18963) and those from Séran (Rutten 1832), have unusually long flowers. The fruit are rather large in the specimens described as *A. borneense* by Merrill, being up to 35 mm long, and attenuate not only towards the apex but also towards the base. The specimen Clemens 29216 from Mt. Kinabalu is the only one, not only of the species, but also of the whole section, that has glabrous styles. As fruit are lacking the determination is somewhat doubtful.

Styrax javanicum Blume, Bijdr., 13, p. 671 (1825); A. De C., in D.C., Prodr., 8, p. 268 (1844); Miquel, Fl. Ind. Bat., I, 2, p. 464 (1859); Kurz, in Journ. As. Soc. Beng., 40, II, p. 61 (1871); in Flora, 54, p. 273 (1871); in Nat. Tijschr. Ned. Ind., 34, p. 107 (1874); Boerl., Handl. Fl. Ned. Ind., 2, p. 232 (1891); Greshoff, Schetsen, p. 118 (1896); Koord. & Valet., Bijdr. booms. Java, 7, p. 13 (1900); Perkins, in Engl., Pflanzenr., IV, 241, p. 85 (1907); Van Steenis, in Bull. Jard. Bot. Buitenz., ser. 3, 12, p. 253 (1932); *Marlea ebenacea* Clarke, in Hook. f., Fl. Br. Ind., 2, p. 742 (1879); Sertor., in Bull. Herb. Boiss., 1, p. 473—615 (1893); Ridley, in Agr. Bull. Straits & Fed. Mal. St., new ser., 1, p. 181 (1902); *Marlea costata* Boerl., Handl. Fl. Ned. Ind., I, 2, p. 654 (1890) non alior.; *Karangolum ebenaceum* Kuntze, Rev. gen. pl., 1, p. 273 (1891); *Alangium ebenaceum* Harms, in Engl. & Pr., Nat. Pflanzenfam., III, 8, p. 262 (1898); King, in Journ. As. Soc. Beng., 71, II, p. 78 (1902); Wanger., in Engl., Jahrb., 38, Beibl. 86, p. 63—68 (1906); in Engl., Pflanzenr., IV, 220b, p. 14 (1910); Heyne, Nutt. pl. Ned. Ind., ed. 1, 3, p. 402 (1917); ed. 2, 2, p. 1217 (1927); Ridley, Fl. Mal. Pen., 1, p. 893 (1922); *Alangium arboreum* Greshoff, Meded. 's Lands Plantent., 25, p. 91 (1898), nomen; *Marlea javanica* Koord. & Valet., Bull. Inst. Bot. Buitenz., 2, p. 2 (1899); Bijdr. booms. Java, 5, p. 76 (1900); Koord., in Natuurk. Tijdschr. Ned. Ind., 60, p. 380 (1901); Boldingh, Cat. pl. Herb. Hort. Bogor., p. 145 (1914); Jansson., in Moll & Janss., Mikrogr., 3, p. 721 (1918); *Nyssa Hollrungii* Schumann, in Schum. & Lauterb., Nachtr. Fl. deutsch. Schutzgeb. Südsee, p. 334 (1905); Wanger., in Engl., Pflanzenr., IV, 220a, p. 15 (1910); *Alangium meyeri* Merrill, in Publ. Governm. Labor., 35, p. 54 (1906); in Phil. Journ. Sc., 1, suppl. 1, p. 111 (1906); Wanger., in Engl., Pflanzenr., IV, 220b, p. 15 (1910); Merrill, in Phil. Journ. Sc., bot., 7, p. 321 (1912); 21, p. 531 (1922); Enum. Phil. Fl. Pl., 3, p. 241 (1923); **Melchior & Mansf.**, in Engl., Jahrb., 60, p. 163 (1925); Merrill, in Univ. Calif. Publ. Bot., 15, p. 232 (1929); *Alangium costatum* Wanger., in Engl., Jahrb., 38, Beibl. 86, p. 61—83 (1906) nomen; *Alangium Mezianum* Wanger., in Engl., Jahrb., 38, Beibl. 86, p. 61—65 (1906); in Fedde, Repert., 4, p. 338 (1907); in Engl., Pflanzenr., IV, 220b, p. 15, ic. 3, F—J (1919); Merrill, Journ. Str. branch, Roy. As. Soc., spec. numb. 1921, p. 459 (1921); *Alangium bogoriense* Wanger., in Fedde, Repert., 4, p. 338 (1907); in Engl., Pflanzenr., IV, 220b, p. 11 (1910); Dakkus, in Bull. Jard. Bot. Buitenz., ser. III, suppl. 1, p. 13 (1930); *Alangium javanicum* Wangerin, in Engl., Pflanzenr., IV, 220b, p. 14 (1910); Koord., Exkursionsfl., Java, 2, p. 731, 733 (1912); Koord.-Schum., Syst. Verz., 1, fam. 229, p. 102 (1912); Dakkus, in Bull. Jard. Bot. Buitenz., ser. III, suppl. 1, p. 13 (1930); *Alangium tutela* Ridl., in Journ. Roy. As. Soc., Str. Br., 61, p. 10 (1912); Fl. Mal. Pen., 1, p. 894 (1922); *Alangium borneense*

MERRILL, in Journ. As. Soc., Str. Br., 86, p. 342 (1922); *Alangium salviifolium* BAKER, in Journ. of Bot., 62, suppl. p. 45 (1924) pro parte; *Alangium Hollrungii* & *A. papuanum* MELCH. & MANSF., in ENGL., Bot. Jahrb., 60, p. 163, 165 (1925); *Alangium sessiliflorum* MERRILL, in Univ. Calif. Publ. Bot., 15, p. 232 (1929); *Alangium oblongum* CRAIB, in Kew Bull. 1930, p. 426 (1930).

Var. **minahassicum** BLOEMB., nov. var. — Fructus statu sicco 30—34 mm longus, 16—17.5 mm latus, 9—12 mm crassus, in alcohole conservatus ad 35 mm longus, 19 mm latus, 14 mm crassus, disco 2—3 mm alto, calycem 1—1.5 mm altum distincte superans. Flores ignoti. **Cfr. fig. 5, w—x.**

Distribution: Selebes, Minahassa, and Halmahéra.

The fruits from both localities are strikingly similar.

Var. **papuanum** (MELCH. & MANSF.) BLOEMB., nov. var. — Filamenta 1.5—3.1 mm longa, 0.5—1.5 mm lata, omnino glabra vel pilis nonnullis in utroque latere apicis. Flores in statu alabastri tantum noti, 6—17.8 mm longi. **Cfr. ic. 5, y—aa.**

Nyssa Hollrungii SCHUMANN, in SCHUM. & LAUTERB., Nachtr. Fl. deutsch. Schutzgeb. Süds., p. 334 (1905); *Alangium Hollrungii, A. Meyeri, & A. papuanum* MELCH. & MANSF., in ENGL. Bot. Jahrb., 60, p. 163—165 (1925).

Distribution: New Guinea.

Except by the peculiar filaments the New Guinea specimens of *A. javanicum* are characterized by thin twigs with small leaves, but similar forms are found in most different parts of the area, especially in dry regions.

Var. **Jaherii** BLOEMB., nov. var. — Fructus 32—33 mm longi, 13—15 mm lati, 8—9 mm crassi, costis 10—12 crassis obtusis, et sulcis profundis. Flores ignoti. **Cfr. ic. 5, bb**

Distribution: Kai Islands.

The fruit are somewhat similar to those of *A. Ridleyi*, but they are shorter and especially narrower an more acute towards both ends.

Distribution of the species:

MALAY PENINSULA. Perak: SCORTECHINI 1963 (BD, L); Tupai, plains, WRAY 3302 (S); Larut, 90—240 m alt., KING's coll. 3252 (B, BD); 150—240 m alt., KING's coll. 5363 (BM, E, K); within 30 m alt., KING's coll. 6626 (K, L); Pahang: Temerloh, Kemansul forest reserve, HAMID 10887 (K, S); Belingor forest reserve AWANG-LELA 4511 (S), v.n.: *petong ka-kura*; Kuantan, BURN MURDOCH s.n. (S); Selangor: Weld's Hill forest reserve, BURN MURDOCH 27 (K); AHMAD 4748 (K, S), v.n.: *medang*; HAMID 562 (S), v.n.: *kelat*; Rantau Panjang, STRUGNELL 12487 (S); Sungei Buloh forest reserve, ABU 3311 (K, S), v.n.: *melidah*; Malacca: GRIFFITH s.n. (BM, K); GRIFFITH (Kew distr.) 3383 (BD, K), first no. cited by CLARKE of *Marlea ebenacea*; MAINGAY (Kew distr.) 706 (K, L), 2nd no. cited by CLARKE of *Marlea ebenacea*; ALVINS 1171 (S), v.n.: *pokô kulat kurantaû*; Tuniang, ALVINS 1695 (S), v.n. *pokô kaiu lida lida*; Merlimau, ALVINS 2161 (S), v.n.: *pokô pachat kuniang*; Selandau, GOODENOUGH 1809 (S), v.n.: *autoi* (*antoi?*); Johore: Sungei Tebrau, RIDLEY 13223 (K, S); Panti, BAIN (?), 6006 (K, S), v.n.: *kahwa kahwa*; Singapore: Ponggol, GOODENOUGH (RIDLEY) 5082 (BM, S), v.n.: *kayu tass*, anti-tiger-tree, type of *Alangium tutela* RIDLEY.

Simeuloeë, Achmad 18 (B, L), v.n.: *taramajang*; 1266 (B, L, U), v.n.: *bidara oeding*; Dèfajan, Tapah, Achmad 1423 (B, L), v.n.: *taramajang oeding*; 1365 (B, L), v.n.: *bidara pajo*; 1509 (B, L), v.n.: *taramajang boeloh.*

Sumatra. Without further locality: cultivated in the Buitenzorg Botanic Garden under V. E. 35 & 35a (B) sub nom. „*Alangium arboreum* T. & B.''; Subdiv. Lower Langkat (Oostkust), near Aloer Goesta, alt. 50 m, Boschpr.bb. 16. 630 (B), v.n.: *patimah*; Painan (W. Kust), Kp. Baroeng-baroeng Balantai, Boschpr. S.W. K. I. 30 (B), v.n.: *kalek poetih ranting*; Oud-Agam, Sg. Dareh, Kp. Batastjoeli, 1200 m alt., Boschpr. S.W.K. II. 30 (B), v.n.: *kalek kopi*; Manindjang, Kp. Silajang, Boschpr.bb. 5221 (B, L), v.n.: *bantoenan*; Pariaman, Kp. Tandjoeng, 400 m alt., Boschpr.bb. 6722 (B), v.n.: *kali toelang*; Kroë (Bengkoeloe), Kota Bonglai, 900 m alt., Boschpr.bb. 10286 (B), v.n.: *giok koendjir*; Palembang, Kapar Litjin, R. Rawas, 450 m alt., Forbes 3173 (BM, K, L), according to Baker in Journ. Bot., vol. 62, suppl., p. 45 from Moeara Mengkoelem, R. Rawas, 150 m alt.; Banjoe-Asin- & Koeboe-streken, 20 m alt., Grashoff 721 (B, L), v.n.: *kajoe nanau*, Bajoenglintjir, 15 m alt., Boschpr. 31. T. 1. P. 35 (B, L), v.n.: *kajoe manau*; Lematang Hilir, Endert 101 (B, L), v.n.: *kajoe manau*; Lampongs, Teysmann 6717 (B), v.n.: *harikoekoen*, and cultivated in the Buitenzorg Botanic Garden, labelled partly „*Alangium arboreum* T. & B.” and partly „*Cyclostemon mucronatum* Bl.” (B, K, L, S), in (L) type of *Marlea costata* Boerl. = *Alangium bogoriense* Wanger.

Lingga Archipelago. P. Lingga, Sg. Dai, Teysmann 6664 H.B. (B), v.n.: *boewa tas.*

Anambas & Natoena Islands. P. Boengoeran, G. Ranai, 200 m el., Van Steenis 1263 (B, L, S); 250 m el., Van Steenis 1221 (B, U), v.n.: *kajoe kenelan.*

Borneo. British North Borneo, Mt. Kinabalu, Kundusang, 900 m el., Clemens 29216 (B, NY); near Sandakan, Suanlamba River, 10 m el., Agama 550 (M), v.n.: *lasit*; Batu Lima, low alt., Agama 1022 (B, BD, BM, L, M) type of *Alangium borneense* Merr.; Ramos 1451 (B, BD, BM, L, M); Batu Lapan, Wood 2252 (K, UC), type of *Alangium sessiliflorum* Merrill; Bettottan, Kloss 18963 (B, S); Tawao, Elmer 21116 (B, BD, K, NY, S, U), 21165, 21176, 21422, 21447, 21750 (B, BD, BM, K, NY, S, U), 21553 (B); Sarawak: Rejang, Kapit, and Rejang, Sitri, Kalong (Haviland) 2885 (B, L, S, Sa); West-Borneo: Soengai Sibau, Hallier B. 1231 (B, L); Koeboe, Kp. Ombawang, 50 m alt., Boschpr. W. B. bb. 7141 (B), v.n.: *birong*; East-Borneo: Boengoelan, Kp. Kabiran, 100 m alt., Boschpr.bb. 11732 (B), bb. 11749 (B), v.n.: *enkenolan*; West-Koetai, near Keloempang, alt. 40 m, Boschpr.bb. 16.932 (B), v.n.: *beremkoelat.* East-Koetai Sankoelirang, Kp. Pendangan, Sg. Bai, 25 m el., Boschpr.bb. 12982 (B) v.n.: *ladjik*; Kp. Palawan, 50 m el., Boschpr.bb. 11945 (B), v.n.: *toebo*; South-Borneo: Midden-Doesoen, Kp. Penangin, 75 m el., Boschpr.bb. 12464 (B), v.n.: *trangolon.*

P. Laoet. Kp. S. Paring, 100 m alt., Boschpr.bb. 12381 & 12910 (B), v.n.: *marlapang.*

Java. Cultivated in the Buitenzorg Botanic Gardens, from Java, without exact locality, sub VIII. F. 25 & 25a (B), v.n.: *kiparang*; Blume s.n. (B, NY), originals of *Styrax javanicum* Blume; Tjiampèa near Buitenzorg, Koorders forest no. 402*, herb. no. 30124 β (B, L); for. no. 405*, herb. no. 30599 β (B, L); 200—300 m alt., Koorders for. no. 484*, herb. no. 30601 β (B), for. no. 485*, herb. no. 30600 β (B, L); Sanggrawa, Djampangkoelon near Soekaboemi, 400 m el., Koorders 6079 β (B, BD, K, L).

SELEBES. Subdivision Boalemo (= Tilamoeta), near Kampong Popaja, alt. 300 m, BOSCHPR.BB. 15.699 (B), v.n.: *tintibotoe*; subdiv. Donggala, near Kampong Bambamate, alt. 150 m, BOSCHPR.BB. 17.056 (B), v.n.: *lokoe*; subdiv. Malili, near Kampong Kawata, BOSCHPR. Cel. V. 199 (B), v.n.: *lansabonti poete.*

TALIABOE. Waekoejoe, ATJè (Exp. HULSTIJN) 255 (B, L).

MOLUCCAS. Without exact locality, cultivated in the Buitenzorg Botanic Garden under IX. D. 51 (B); island Kasiroeta (= Groot Tawali), near Dinga, alt. 10 m, BOSCHPR.BB. 16.440 (B), v.n.: *soa-soa maki;* island Batjan, near Geti, alt. 15 m, BOSCHPR.BB. 16.450 (B), v.n.: *koko & beo*; island Séran, Wai Kawa 100—200 m alt., RUTTEN 1832 (B, L); island Ambon, near Soeli, alt. 70 m, BOSCHPR.BB. 18.104 (B), v.n.: *samar.*

Further distribution of the species: Siam.

Distribution of the var. *minahassicum*:

SELEBES. In the Buitenzorg Botanic Garden under IV, F. 99 (B, L), coll. by BOERLAGE, VALETON & KOORDERS (20844β), cultivated from fruit collected by KOORDERS near Manado.

HALMAHERA. West Pitoe, 80 m el., BEGUIN 2262 (B, L).

Distribution of the var. *Jaherii:*

KAI ISLANDS. JAHERI s.n. (B).

Distribution of the var. *papuanum:*

NEW GUINEA. N. E. Part.: April River, Bivouac 18, 15—20 m el., LEDERMANN 9795 (BD); 200—400 m el., LEDERMANN 9818 (BD), 9829 (BD); Augusta River, 2nd station, HOLLRUNG 720 (BD); Augusta River, Malu, Ficus Ridge, 100—200 m el., LEDERMANN 10851 (BD), 20—30 el., LEDERMANN 11534 (BD); Bani-Schlucht, 50—100 m el., LEDERMANN 8137 (BD).

16. Alangium maliliense BLOEMBERGEN, n. sp. — *Internodia* inter folia adulta 1—3.5 cm longa, 1.5—5 mm crassa, pilis ramosis velutino-tomentosa. *Petiolus* 4—8 mm longus, velutino-tomentosus; lamina circuitu rotundato-elliptica ad oblonga, saepe paulum ovata, basi rotundata vel leviter cordata, subsymmetrica, 4.5—9.5 cm longa, 3—4.5 cm lata, apicem obtusum versus plerumque abrupte brevissime acuminata, facie superiore glabra, facie inferiore nervis pilis stellatis subhirsuto-velutinis, inter nervos pilis stellatis semitecta, omnino penninervis, chartacea vel tenuiter coriacea, nervis lateralibus 8—15 utrinque. *Inflorescentiae* omnino velutino- vel subhirsuto-tomentosae, 1—2 × ramosae, 1—5-florae, 5—14 mm longae (floribus exclusis), pedunculo vel eo absente ramis primariis 4—12 mm longis, pedicellis 2—8 mm longis; bracteae triangulares, 0.75—2 mm longae, 0.5—1.5 mm latae. *Flores* 6—7-meres, plerumque 7-meres, circiter 17—21 mm longi; calyx eodem indumento ac inflorescentia, subinfundibuliformis, 3 mm longus, limbo subcupuliformi 0.75 mm longo circiter 5 mm lato, dentibus triangularibus 0.5—1 mm longis; corolla statu alabastri adulti subcylindracea 4 mm lata, supra basin ad 5—5.5 mm inflata, apice obtusissima; petala 14—17.5 mm longa, facie exteriore pilis ramosis densissime hirsuto-velutina, facie interiore parte basali excepta adpresse pilosa; stamina aequo numero

ac petala, 13—17 mm longa; filamentum 4—5.5 mm longum, basi apiceque c. 1 mm, medio fere 2 mm latum, facie interiore apice valde incrassatum, dorso densiuscule puberulo, marginibus apicem versus et incrassatione pilis longiusculis densissime velutino-barbatis, anthera 9—11.5 mm longa, connectivo glabro; stylus subcylindraceus, stigma versus paulum attenuatus, 8—10.5 mm longus, medio 1.25—1.5 mm crassus, densissime adpresse pilosus; stigma obtuse conicum, 2 mm longum, basi 1—1.25 mm latum; discus 6—7-lobus, 0.5—0.75 mm altus, 2.75—3 mm diametro; ovarium uniloculare. *Fructus* statu sicco ellipsoides, leviter compressus, basi rotundatus vel breve conicus, apice rotundatus, 23—27 mm longus (calyce incluso), 12—14 mm latus, 9—11 mm crassus, pilis stellatis et ramosis densissime hirsuto-velutinus, costis numerosis obtusis passim reticulatis, apice calycis limbo persistente et disco non exserto coronatus.

By the form of the stigma and the structure of the inflorescence this new species certainly belongs to the 4th section. With *A. nobile* it agrees in the velvety-hirsute indumentum, the leaf-shape and the strongly reticulate nervation on the underside of the lamina. The lamina is, however, entirely penninervous, as in *A. Havilandii, A. Ridleyi* and *A. javanicum*. With *A. Ridleyi* and *A. javanicum* it agrees by the filaments not having a narrower upper portion, with *A. javanicum* by the mode of ramification of the twigs. The fruit reminds of that of *A. nobile* and *A. Ridleyi* as to the form. Besides by the combination of characters in general, *A. maliliense* is characterized by the ochraceous colour of its indumentum and the strongly developed thickening at the top of the filaments inside.

SELEBES. Subdivision Malili, near Kampong Kawata, alt. 300 m, BOSCHPR. Cel. V. 161 (B), tree 30 m, trunk 20 m tall, 64 cm diameter, flowers white, with aromatic odour, fruit yellowish brown or yellow-orange, without odour, sweet and sour; v.n.: *moroipo*; collected thrice from the same tree, Sept. 27, 1932, with flower (WATURANDANG 43), Nov. 19, 1932, with fruit (WATURANDANG 158), and Dec. 21, 1932, with fruit (WEISMANN 210).

The last species has been added afterwards when the manuscript had already been sent to the printer. This is the cause why it has not been taken up in the determination keys and in the general discussions.

Doubtful form.

Marlea tomentosa var. **dentata** KOORDERS & VALETON — Whereas the varieties *genuina* and *rotundifolia* of *Marlea tomentosa,* as given by KOORDERS and VALETON, are accepted as distinct species in this paper, the var. *dentata* of the same species has remained a doubtful form. It is hardly doubtful whether these form will later prove to be a form of one of the former varieties, distinguished here as *A. Kurzii* and *A. rotundifolium,* but the herbarium materials examined are scanty, and only one of the 3 numbers has few flowers and none has any fruit. Moreover

all seem to be youth forms, as is evident from the large laminae (8—26 by 5—24 cm) with 3 apices. The indumentum reminds of *A. rotundifolium* as to its nature; the long flowers (23—30.5 mm long, according to Koorders & Valeton even to 32 mm long) remind of *A. Kurzii*; for these long flowers the filaments are remarkably short, viz. 3—5 mm.

The specimens examined are:

West-Java, G. Tiloe near Pengalengan, 1580 m el., Koorders 1304β & 1305β (B), v.n.: *kitjaruh,* youth form, corolla, filaments & style white, anther yellow; forest Tjigenteng (Tjisondari), Koorders 1310β (B, L), v.n.: *kitjareh,* youth form.

Species wrongly recorded for the area.

Alangium decapetalum, recorded for the Malay Archipelago by Miquel (Fl. Ind. Bat., I, 1, p. 744) and by Kurz for Bangka (Nat. Tijdschr. Ned. Ind., 27, p. 169), and *A. salviifolium* ssp. *decapetalum,* recorded with doubt for Java by Koorders (Exkursionsfl. Java, 2, p. 773) do not occur in the area dealt with in this paper.

Species reiciendae.

Alangium celebicum Koorders, in Meded. 's Lands Plantent., 19, p. 623 (Versl. dienstr. Minahassa, p. 492) (1898); Wangerin, in Engl., Pflanzenr., IV, 220b, p. 24 (1910); Koord.-Schum., Syst. Verz., 2, fam. 229, p. 100 (1914).

As is evident from originals in the Buitenzorg, Leiden and Kew herbaria, named by Koorders as *Alangium celebicum* [Koorders, forest number 2517* with herb. no. 19627β (B, L), and forest number 2455* with herb. no. 16873β (B, L), and Riedel s.n. (K)], this is not an *Alangium* at all, but I could not trace its right name.

Alangium kinabaluense W. W. Smith, in Notes Bot. Gard. Edinb., 8, p. 315 (1915); Merrill, in Journ. Str. Br. Roy. As. Soc., spec. numb. 1921, p. 459 (1921).

This species, based upon a specimen from Mt. Kinabalu, native coll. 49 (E, K), is **Polyosma Hookeri** Stapf, in Hooker, Icon. plant., 23, t. 2296 (1894).

LIST OF COLLECTORS' NUMBERS,

with reference to the species by means of their number.

Abu 2297 = 8; 3311 = 15; 6505 = 8.

Achmad 18 = 15; 339 = 1; 372 = 14; 1271 = 14; 1266 = 15; 1297 = 14; 1365 = 15; 1423 = 15; 1428 = 14; 1509 = 15.

Agama 560 = 15; 1022 = 15.

Ahmad 4748 = 15.

Ajoeb (Exp. Jacobson) 180 = 5; 370 = 7; 445 = 1.

Alvins s.n. = 14; 356 = 12; 1171 = 15; 1695 = 15; 2161 = 15.

Amdjah 807 = 8.

Atjè (Exp. Hulstijn) 255 = 15.

Awang-Lela 4511 = 15.

Backer 2829 = 4; 3529 = 4; 7975 = 4; 12214 = 5; 12324 = 5; 14187 = 5; 16604 = 1; 17546 = 1; 17764 = 1; 22538 = 5; 25231 = 4; 25396 = 4; 25721 = 5; 30578 = 4; 32021 = 1.

Bain (?) 6006 = 15.

Bakhuizen van den Brink 1561 = 5; 7718 = 5.

Bartlett 8703 = 6.

Beccari P. B. 98 = 1; P. B. 229 = 1; P. B. 631 = 5; P. B. 2377 = 12; P. B. 2927 = 12; P. B. 3611 = 12.

Becking 53 = 9.

Beguin 582 = 12; 1977 = 8; 2262 = 15.

Blume s.n. = 4 (2 ×), 6 (2 ×), 9, 15.

Boschproefstation (Forest Experiment Station)

bb numbers: 3938 = 6; 4922 = 6; 5221 = 15; 5349 = 6; 5414 = 4; 5646 = 6; 6142 = 14; 6722 = 15; 6806 = 5; 7178 = 14; 7292 = 5; 7289 = 5; 8632 = 5; 9734 = 4; 9757 = 5; 10248 = 15; 11370 = 9; 11702 = 15; 11749 = 15; 11945 = 15; 12227 = 5; 12891 = 15; 12903 = 15; 12914 = 15; 12982 = 15; 14.352 = 9; 15.699 = 15; 15.729 = 5; 16.448 = 15; 16.459 = 15; 16.639 = 15; 16.932 = 15; 17.056 = 15; 18.104 = 15.

Other numbers: Cel. V. 128 = 8; Cel. V. 161 = 16; Cel. V. 199 = 15; E. 1214 = 6; Ja. 1724 = 5; S. W. K. I. 39 = 15; S. W. K. II. 39 = 15; T. 52 = 3; T. 1159 = 14; T. 3. P. 864 = 12; W. B. bb. 7141 = 15; 1. P. T. 789 = 14; 1. P. T. 797 = 14; 31. T. 1. P. 35 = 15; 131. T. 3. P. 369 = 14; 160. E. 3. P. T. 369 = 14; 160. E. 1. P. 852 = 14.

Bosscha s.n. = 5.

Botanic Garden, Buitenzorg III. G. 66 & 66a = 1; IV. F. 99 = 15; VII. E. 35 & 35a = 15; VIII. F. 25 & 25a = 15; VIII. H. 14 & 14a = 14; VIII. H. 17 = 14; IX. A. 20 & 20a = 14; IX. A. 22a = 1; IX. D. 51 = 15; XI. C. 7a = 14; XII. B. 207 & 207a = 1; XII. B. 201a = 1; XVII. C. 133a = 1; XVII. C. 135 = 1; XVII. C. 136 & 136a = 1.

Botanic Garden, Sibolangit 80 = 6.

Brass 1966 = 10.

Bünnemeijer 3754 = 6.

Burkill 907 = 5.

Burkill & Haniff 12851 = 5; 16450 = 14; 17069 = 8.

Burn Murdoch s.n. = 15; 27 = 15; 14152 = 8.

Busse 1489a = 1.

Buysman s.n. = 4.

Cantley's collector s.n. = 14.

Clason 989 = 4.

Clemens 21649 = 8; 26705 = 5; 29216 = 15; 30527 = 2.

Coles 189 = 4.

Cubitt's collector 889 = 8.

Curtis 940 = 6; 1505 = 12; 2689 = 5; 3736 = 14.

De Jong 38 = 4.

Des Amorie van der Hoeven s.n. = 6.

De Vriese s.n. = 1.

Dommers 82 = 1; 216 = 1.

Elbert 478 = 4; 4153 = 4; 4179 = 4.

Elmer 21116 = 15; 21165 = 15; 21176 = 15; 21422 = 15; 21447 = 15; 21750 = 15; 21553 = 15.

Endert 101 = 15; 4052 = 7; 4076 = 7.

Forbes 1899 = 5; 2739 = 8; 2785 = 6; 2812 = 8; 2813 = 8; 2894 = 1; 3173 = 15.

Fox 122 = 5.

Galoengi 325 = 6.

Garai 2018 = 7.

Goodenough 1809 = 15; 5077 = 12; 5082 = 15.

Grashoff 721 = 15.

Griffith s.n. = 12 (2 ×), 15; 3383 = 15; 3384 = 12; 3385 = 12; 3387 = 8.

Hallier B. 1231 = 15; B. 3238 = 3.

Hamid 562 = 15; 10887 = 15.

Hashim 493 = 8.

Haviland 3019 = 13. Cfr. also Garai, Kalong.

Haviland & Hose 3285 = 13.

Henderson 11833 = 5; 20197 = 1; 21889 = 14; 24546 = 8.

Henderson & Nur 18554 = 5; 21750 = 5.

Hollrung 720 = 15.

Holttum 9310 = 8.

Horsfield s.n. = 1 (2 ×), 4.

Hosseus 440 = 8.

Houtsoorten van den Gedeh 175 = 9.

Iboet 39 = 8.

Jaheri s.n. = 15.

Jelinek (Exp. Novara) s.n. = 6.

Junghuhn s.n. = 4, 5 (4 ×), 9 (2 ×).

Kalong 1505 = 2; 2885 = 15.

Kerr 1172 = 6.

King's collector 563 = 8; 3252 = 15; 3329 = 8; 3593 = 8; 5363 = 15; 5590 = 1; 5824 = 8; 6047 = 12; 6116 = 12; 6626 = 15; 8281 = 8; 10183 = 8; 10523 = 8; 10892 = 12.

Kloss 18963 = 15.

Koorders

herbarium numbers, followed by a β: 868 = 4; 869 = 4; 1300 = 5; 1301 = 5; 1302 = 5; 1303 = 4; 1304 = cfr. p. 288; 1305 = cfr. p. 288; 1306 = 5; 1307 = 5; 1308 = 5; 1309 = 5; 1310 = cfr. p. 288; 3766 = 9; 3767 = 9; 6079 = 15; 8534 = 9; 8535 = 9; 8585 = 9; 8586 = 9; 8587 = 9; 10038 = 9; 10050 = 9; 10051 = 9; 10057 = 9; 10059 = 9; 10061 = 9; 10073 = 8; 10087 = 9; 11249 = 5; 12492 = 5; 13191 = 8; 13876 = 5; 13982 = 5; 14384 = 4; 14385 = 9; 14387 = 9; 14388 = 9; 14639 = 9; 14640 = 9; 14902 = 9; 15691 = 8; 16873 = cfr. p. 288; 19627 = cfr. p. 288; 20747 = 9; 20748 = 9; 20844 = 15; 20934 = 4; 20998 = 8; 21044 = 9; 21100 = 9; 21101 = 9; 21103 = 9; 21321 = 1; 22215 = 5; 22258 = 6; 23676 = 4; 23986 = 6; 24161 = 5; 25821 = 5; 26569 = 5; 27703 = 5; 28511 = 9; 28757 = 9; 28895 = 8; 28896 = 9; 28897 = 8; 29098 = 1; 29125 = 1; 30124 = 15; 30232 = 4; 30343 = 9; 30599 = 15; 30600 = 15; 30601 = 15; 30885 = 9; 31191 = 8; 33038 = 8; 33587 = 1; 33654 = 1; 33904 = 5; 35114 = 1; 38191 = 9; 38376 = 9; 38425 = 9; 38429 = 9; 38488 = 1; 38497 = 9; 38896 = 9; 39303 = 8; 39954 = 9; 40054 = 9; 40075 = 9; 40076 = 9; 40406 = 1; 47884 = 5.

forest or tree numbers, followed by an *: 14 = 5; 26 = 4; 214 = 5; 309 = 5; 402 = 15; 405 = 15; 484 = 15; 485 = 15; 919 = 5; 1120 = 9; 1121 = 8; 1152 = 1; 1249 = 1; 1409 = 1; 1706 = 8; 1837 = 4; 2167 = 4; 2271 = 9; 2455 = cfr.

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Forest or tree numbers, followed by a letter a, t, or w: 1330a = 8; 3180a = 5; 4035w = 9; 4178w = 9; 4187w = 9; 4191t = 9; 4206t = 9; 4217w = 9; 4219t = 9; 4229w = 9; 4271w = 9; 4297w = 9; 7844w = 9; 7922w = 8.

Plantae Junghuhnianae ineditae 58 = 5; 59 = 5.

Korthals s.n. = 5.

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Long 3047 = 12.

Lörzing 640 = 4; 5131 = 6; 5714 = 7; 6322 = 7; 6387 = 7; 8960 = 6; 10058 = 6.

Maingay 705 = 12; 706 = 15; 707 = 12; 708 = 8.

Majid Peon 11622 = 8.

Mat 6020 = 1.

Mousset 264 = 4; 1023 = 4; 1075 = 9.

Nagel 226 = 9.

Native collector 49 = cfr. p. 288.

Noerkas (Exp. Van Vuuren) 287 = 1.

Omar 00054 = 13; 8538 = 8.

Ramos 1451 = 15.

Reinwardt s.n. = 5.

Ridley s.n. = 8; 4578 = 8; 4941 = 14; 5082 = 15; 6020 = 1; 6775 = 1; 10675 = 5; 11095 = 8; 13223 = 15.

Riedel s.n. = cfr. p. 288.

Robinson & Kloss 19 = 5.

Rutten 1831 = 8; 1832 = 15.

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Sow & Tachou 16425 = 14; 16446 = 8; 16857 = 6.

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Teysmann s.n. = 1 (3 ×), 4; 2745 H. B. = 4; 4251 H. B. = 1; 4473 H. B. = 1; 6664 = 15; 6717 = 15; 8957 = 4; 11849 = 1; 11894 = 1; 12117 = 1; 12436 = 1; 13832 = 1.

Teysmann & De Vriese s.n. = 1.

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Van Hasselt s.n. = 5.

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GRAMMATICAL OBJECTIONS TO THE INTERNATIONAL RULES OF BOTANICAL NOMENCLATURE, ADOPTED AT CAMBRIDGE IN 1930,

by

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It is generally known that botanical nomenclature, though sprung from mediaeval scientific Latin, and agreeing, in its orthography for the greater part, in its grammar as much as possible, with classical Latin, shows countless forms which not only from a classical-grammatical, but also from a mediaeval-grammatical point of view, must be looked upon as errors. These errors are for the greater part due to an inadequate knowledge of Latin and Greek grammar, or to indifference or lack of good taste on the part of botanists. And since a botanist cannot be expected to abstain from giving new names to plants until in the opinion of philologists he is sufficiently acquainted with Latin, Greek and other languages which he may have to use, it is unavoidable that the number of philological mistakes in botanical nomenclature should be steadily increasing. It may be disputed whether the mistakes should be corrected, or whether, granting the desirability, such a thing is impossible. The present author was at one time convinced that correction ought to take place systematically, but after some attempts to contribute to it he realised that it was impossible to carry it through in a consistent manner without detriment to botany, and that a non-consistent or a consistent-partial correction would also cause difficulties without giving satisfaction. In any case great indulgence is desirable towards the countless mistakes that have been made in good faith.

This, however, does not alter the fact that it is in all respects desirable to avoid such mistakes in future to the best of our knowledge.

The attitude, however, towards this question, as it is expressed in the International Rules of Botanical Nomenclature, is a remarkable one. In general they recommend a correct application of Latin and Greek grammar, be it now in classical [cfr. Art. 4, al. 3; Art. 7; Recomm. XI, sub (*a*); Art. 27, last sentence; Recomm. 38; Recomm. XLII; Recomm. XLIV], then again in a mediaeval sense [Art. 25; Recomm. X sub (*c*); Recomm. XXXIX sub (*c*); Recomm. XL; Art. 71, sub (4)]. Nevertheless here and there rules and recommendations are found at variance with grammatical rules, irrespective whether the point of view is a classical or a mediaeval one. And contrary to the expectation that such rules will be noticed later on, and cancelled at following congresses, they are seen to increase slowly, and also at the last congress in 1930 new recommendations, and even a new rule, have been added, which not only recommend offences against Latin and Greek grammar, but make these even obligatory. As the knowledge of Latin and Greek grammar of botanists has been steadily deteriorating for the last half century, and is sure to deteriorate still further in the coming decades, the fear is justified that the present and future generations of botanists may take these rules and recommendations as a guide in forming new names, and that the number of mistakes in nomenclature may increase in a unnecessarily high degree. It is for this reason that it seems to me advisable to point out these grammatically incorrect rules and recommendations. The difficulties will be dealt with in the following in the same order in which they appear in the rules themselves. (International Rules of Botanical Nomenclature adopted by the Fifth International Botanical Congress, Cambridge, 1930; suppl. to the „Journal of Botany", June 1934; by Taylor and Francis, London).

Recommendation IX, first sentence: Orders are designated preferably by the name of one of their principal families, with the ending *-ales.*

In connection with this it should be observed that it is desirable to alter the ending *-alis* in *-aris,* when the root to which it is added contains a *l*, especially when this *l* occurs in the last syllable, but with exception of the cases, in which between the *l* of the root and that of the ending occurs a *r*. So one should write *Primulares, Selaginellares,* not *Primulales, Selaginellales.*

Art. 24. Names of subfamilies (*subfamiliae*) are taken from the name of one of the genera in the group, with the ending *-oideae,* &c.

Here we may observe that, strictly speaking, the ending *-oideae* does not exist in Greek or Latin. There are compounds in *-ειδησ*, in Latin ending in *-ides,* which retain *-ides* in the feminine plural. It is an incorrect usage to change the ending *-ides* into *-idea* and *-ideum* in the feminine and neuter, or even to form the ending *-ideus* if transferring such names to the masculine gender. Therefore the formation of words in *-ideae* is incorrect.

Recommendation X, (e), (f), and (g): Botanists who are forming generic names show judgment and taste by attending to the following recommendations:

(*e*) To avoid adjectives used as nouns.

(*f*) Not to give a genus a name whose form is rather that of a subgenus or section (e.g. *Eusideroxylon*, a name given to a genus of *Lauraceae*. This, however, being legitimate, cannot be altered).

(*g*) Not to make names by combining words from different languages (*nomina hybrida*).

Sub (*e*) probably only Latin genus-names are meant, as *Mirabilis, Gloriosa* and *Impatiens*, and not the far more numerous Greek ones. Although no one takes offence at those names, and even the Romans used names as Crispus and Rufus, and in later Latin names as Clemens and Felix are numerous, the introduction of genus-names as *Pennatus* and *Glandulosus* is certainly not to be recommended. In Greek, however, the case is entirely different. Cfr. the discussion of art. 72.

With regard to (*f*) it may be pointed out, that the names referred to, namely those with *Eu-*, denoting a subgenus or section, are grammatically wrong, and that it would be unfair to avoid correctly formed names, as *Eusideroxylon, Eucalyptus, Euonymus,* &c. on account of this paragraph. See further discussion of Recomm. XI.

As to (*g*) it may be said that the formation of *nomina hybrida* (rectius *hibrida*) occurred already in classical Latin, and that it was far from rare in mediaeval Latin. The puritanical point of view, expressed in the above recommendation, is inconsistent with the further grammatical tendency of the rules for nomenclature.

Recommendation XI, (a) and (b): Botanists constructing names for subgenera or sections will do well to attend to the preceding recommendations and also to the following:

(*a*) To give, where possible, to the principal division of a genus a name which recalls that of the genus with some modification or addition. Thus *Eu-* may be placed at the beginning of the generic name when it is of Greek origin, *-astrum, -ella* at the end of the name when Latin, or any other modification consistent with the grammar and usages of the Latin language: e.g. *Eucardamine* (from *Cardamine*), *Drabella* (from *Draba*).

(*b*) To avoid giving to a subgenus or section the name of the genus to which it belongs, with the ending *-oides* or *-opsis*: but on the contrary to reserve this ending for a section which resembles another genus and by then adding *-oides* or *-opsis* to the name of that other genus, if it is of Greek origin, to form the name of the section.

As to (*a*) it should be noticed that the formation of subgenera and sections by means of prefixing *Eu-* to genus-names is a misuse in a grammatical sense, and that either lack of grammatical knowledge or lack of good taste underlies the formation of such names. In the first place because Greek *εὐ* does not mean „genuine" (this ought to be *γνησιοσ*), and secondly because the formation of compounds by fusing a qualifying adjective with a qualified noun is not permissable in Greek (in Sanskrit, however, and in German, this is possible). The names referred to, formed by means of prefixing *Eu-* (cfr. e.g. Engl. & Prantl, Nat. Pflanzenfam., Register zu II—IV, p. 156—171) have either no meaning whatever or a meaning entirely different to what is intended. An *Eualoë* is nothing, and a plant cannot be *eualoë*; an *Euarabis* is nothing, and a plant cannot be *euarabis*. *Euloranthus* does not mean a genuine *Loranthus*; *Gnesioloranthus* would be an incorrect formation. *Euloranthus,* however, means a flower with fine or large straps, or a plant having flowers with fine or large straps. *Euartocarpus* means a fruit yielding good bread, or a plant yielding good bread-fruit. *Gnesio-aloë* or *Gnesiarabis* would be an un-Greek formation, though *γνησιοσ* would at least mean „genuine".

As to (*b*) it may be observed that here reference is made to the ending *-oides*. Grammatically it would have been better to speak of the ending *-ides*. This ending is often not understood even by botanists with a classical training. Otto Kuntze, for instance, changed all names in *-oides* into such in *-odes*. It would be preferable to speak of compounds with Greek *εἶδοσ*.

Recommendation XXXIV again mentions names compound with *Eu-,* about which the reader is requested to compare the discussion of Recommendation XI.

Recommendation XXXV goes still farther and recommends for subspecies and varieties names composed with *eu-,* as *eu-alpina,* which, if possible, is even more inconsistent with grammar and good taste than the cases dealt with in Recommendation XI.

Recommendation XXXVI mentions the ending *-oideae*, which is incorrect, and the ending *-ales*, without drawing the attention to the form *-ares*. Cfr. the discussion of Recommendation IX and Art. 24.

Recommendation XL, (a), (b), and (d). When a new specific or other epithet is taken from the name of a man, it should be formed in the following manner:

(*a*) When a name of the person ends in a vowel, the letter *i* is added (thus *Glazioui* from Glaziou, *Bureaui* from Bureau) except when the name ends in *a*, when *e* is added (thus *Balansae* from Balansa).

(*b*) When the name ends in a consonant, the letters *ii* are added (thus *Magnusii* from Magnus, *Ramondii* from Ramond), except when the name ends in *-er,* when *i* is added (thus *Kerneri* from Kerner).

(*d*) When epithets taken from the name of a person have an adjectival form they are formed in a similar way (e.g. *Geranium Robertianum, Verbena Hasslerana*).

As to (*a*) and (*b*) I will merely remark that in these paragraphs so little heed is paid to grammar that they are obviously only intended as an aid to memory for those who do not know a word of Latin or Greek. Moreover, they unnecessarily tie botanists down to stringent rules, which in the middle-ages were not used. There is no single reason for adhering to this recommendation rigidly, so long as one is more or less acquainted with mediaeval Latin; for those, however, who are not, there is just as little reason to depart from it.

In (*d*), however, a mistake has crept in. Here the impression is made that the ending *-ianus*, with which *Robertianus* is formed, ought to be changed into *-anus*, when the name ends in *er*. It is true that the Romans themselves sometimes used *-anus* instead of *-ianus*, but in order to avoid confusion with the ending *-anus*, e.g. of *africanus*, which has a different meaning, this is in no case to be recommended to botanists, neither for names in *-er*, nor for other names. *Hassleriana* therefore is better than *Hasslerana*.

Art. 72, (2). The gender of generic names is governed by the following regulations:

(1) ....

(2) Generic names which are modern compounds formed from two or more Greek or Latin words take the gender of the last. If the ending is altered, however, the gender will follow it.

Examples of names formed from Greek words: The generic name *Andropogon* L. was treated by Linnaeus as neuter, but it, like all other modern compounds in which the Greek masculine word *pogon* is the final element (e.g. *Centropogon, Cymbopogon, Bystropogon*), is now treated as masculine. Similarly all modern compounds ending in *-codon, -myces, -odon, -panax, -stemon* and other masculine words are masculine. The generic names *Dendromecon* Benth., *Eomecon* Hance and *Hesperomecon* E. L. Greene are treated as feminine, because they end in the Greek feminine word *mecon*, poppy: the fact that Bentham and E. L. Greene respectively ascribed the neuter gender to the names *Dendromecon* and *Hesperomecon* is immaterial. Similarly all modern compounds ending in *-achne, -carpha, -cephala, -chlamys, -daphne* and other feminine words are treated as feminine.

The generic names *Aceras* R. Br., *Aegiceras* Gaertn. and *Xanthoceras* Bunge are neuter because they end in the Greek neuter word *ceras*; the fact that Robert Brown and Bunge respectively made *Aceras* and *Xanthoceras* feminine is immaterial. Similarly all modern compounds ending in *-dendron, -nema, -stigma, -stoma* and other neuter words are neuter. Names ending in *-anthos* (or *anthus*) and those in *-chilos* (or *-chilus*) ought strictly speaking to be neuter, since that is the gender of the Greek words *anthos* and *cheilos*. These names, however, have been with very few exceptions treated as masculine, hence it is agreed to assign that gender to them. Similarly those ending in *-gaster*, which should strictly speaking be feminine, are treated as masculine in accordance with botanical custom.

Examples of compound generic names where the termination of the last word is altered: *Hymenocarpus, Dipterocarpus* and all other modern compounds ending in the Greek masculine *carpos* (or *carpus*) are masculine. Those in *-carpa* or *-carpaea*, however, are feminine, e.g. *Callicarpa* and *Polycarpaea*; and those in *-carpon, -carpum* or *-carpium* are neuter, e.g. *Polycarpon, Ormocarpum* and *Pisocarpium*.

This part of a rule (alas, not only a recommendation) is a mixture of grammatically correct and incorrect remarks and opinions, and for that reason requires a somewhat ampler discussion, the more so because it is a complete innovation compared with the rules of nomenclature of 1910.

To begin with I will make a few remarks on grammatical composition of Greek names in general.

A tree (δενδρον) bearing roses (ῥοδον) may be called a rosetree (ῥοδοδενδρον), in Latin *Rhododendron* or *Rhododendrum*. *Rhododendrum* being a kind of *dendrum*, and *dendrum* being neuter, *Rhododendrum*, too, must be neuter. It is true that such compounds of two nouns of which one qualifies the other, are hardly permissable in classical Greek, but in later Greek they became more and more common and of Greek botanical vocabulary they form an important part.

A shrub (θαμνοσ) that has the shape of a besom, or of which besoms (σαροσ) are made, may be called a besom-shrub (σαροθαμνοσ), in Latin *Sarothamnos* or *Sarothamnus*; and a *Sarothamnus* being a kind of *thamnus*, and *thamnus* being masculine, *Sarothamnus*, too, must be masculine.

A leaf (Φυλλον) consisting of a pair or yoke (ζυγον) of leaflets we may call a yoke-leaf (ζυγοΦυλλον). For the reason mentioned above the name of that leaf must be neuter. But we can transfer the same name to the whole of the plant. In such cases we mention the leaf instead of the plant, and the whole plant is, as it were, a kind of *phyllum*, and the name must therefore be neuter. Such transferred plant-names, which, as a matter of fact, are but names for part of the plant (leaf, flower, fruit, seed) are known in many other languages.

We can, however, give a name to a plant by means of converting an adjective into a noun. Thus in many languages we can indicate plants by names corresponding with e.g. ,,long-leaved", ,,short-fruited", ,,small-seeded", &c., in Greek ΜακροΦυλλοσ or ΜακροΦυλλον, Βραχυκαρποσ or Βραχυκαρπον, Μικροσπερμοσ or Μικροσπερμον, according to what is meant by the name, a tree, δενδρον, a shrub, θαμνοσ, or some other thing. And transcribed into Latin these names are *Macrophyllus, -a, -um, Brachycarpus, -a, -um, Microspermus, -a, -um,* according to whether we indicate a *frutex,* or an *arbor,* or something else by it. It is therefore incorrect, if Recommendation X (*e*) advises to avoid forming genus-names by means of converting adjectives into nouns.

Classical Greek already was very rich in such names, and later Greek even more so. Φιλιπποσ, e.g., was not a kind of ἱπποσ, but some one fond of horses (ἱπποσ). Τιμαρετη was not a kind of ἀρετη, but a woman honouring truth (ἀρετη). Νικολαοσ was not a kind of λαοσ, but some one conquering the people (λαοσ). Εὐβουλοσ was not a kind of βουλοσ, but some one giving good advice (βουλη). Ξανθιπποσ was not a yellow horse, but some one possessing a yellow horse and Ξανθιππη was a woman called after Ξανθιπποσ, or a woman possessing a yellow horse. Ἀνδρομαχοσ was not a kind of μαχοσ, but some one who fought with men, or about whom many men fought, just as Ἀνδρομαχη was a woman either simply called after a certain Ἀνδρομαχοσ, or a woman disputed by men.

The same may be applied to various plant-names.

Ammochloa is a kind of *chloa* (χλοη), *Calamagrostis* a kind of *agrostis* (ἀγρωστισ), *Cephalotaxus* a kind of *taxus*, *Chamaecyparis* a kind of *cyparis*, *Chionodoxa* a kind of *doxa* (δοξα), *Cystopteris* a kind of *pteris* (πτερισ), *Helosciadium* a kind of *sciadium* (σκιαδειον), *Hyoscyamus* a kind of *cyamus* (κυαμοσ), *Liriodendron* a kind of *dendron* (δενδρον), *Melilotus* a kind of *lotus* (λωτοσ), *Oenanthe* a kind of *anthe* (ἀνθη), *Petroselinum* a kind of *selinum* (σελινον), *Pseudotsuga* a kind of *tsuga*. *Sciadopitys* a kind of *pitys* (πιτυσ). All these names should therefore have the gender of the last element of the compound.

By transference *Aegopodium*, too, can be a kind of *podium* (ποδιον), and similarly *Agrostemma* a kind of *stemma* (στεμμα), *Alopecurus* a kind of *urus* (οὐροσ), *Caprifolium* a kind of *folium*, *Ceratophyllum* a kind of *phyllum* (φυλλον), *Equisetum* a kind of *setum*, *Lycopus* a kind of πουσ, *Tragopogon* a kind of *pogon* (πωγων). Therefore these compound names, too, should have the gender of the last element.

Amorpha, however, is not a kind of *morpha*, but a plant without (ἀ-) shape (μορφη); *Ampelopsis* is not a kind of *opsis*, but a plant of a certain appearance (ὀψισ), *Biscutella* is not a kind of *scutella* but a plant with two *scutella*, *Brachypodium* is not a kind of *podium* but a plant with short stalks (ποδιον), *Cephalanthera* is not a kind of *anthera* but a plant with *antherae* of a certain kind, *Ceratocephalus* is not a kind of *cephalus*, but a plant with a certain kind of heads (κεφαλη), *Chorispora* is not a kind of *spora*, but a plant with *sporae* of a definite kind, *Coeloglossum* is not a kind of *glossum*, but a plant with a certain kind of tongue (γλωσσα), *Diëlytra* is not a kind of *elytra*, but a plant with a certain number of elytra (ἐλυτρον), *Dimorphotheca* is not a kind of *theca*, but a plant with two kinds of thecae (θηκη), *Diplotaxis* is not a kind of *taxis*, but a plant with double rows (ταξισ), *Echinops* is not a kind of *ops*, but a plant having the appearance (ὤψ) of a hedge-hog (ἐχινοσ), *Euonymus* is not a kind of *onymus* but a plant bearing a beautiful name (ὀνυμα).

There is no reason whatever for giving these names the gender of the last element; they must take the gender of the noun that is connected with them in our thoughts.

Sometimes the gender is to be recognised by the ending of the name, sometimes not. An example of a name where the gender is not recognisable is *Aceras.* Something having no horn we may call hornless, ἀκερασ, *aceras,* and irrespective whether by this name we mean a masculine, feminine or neuter noun, the name is *Aceras.* On the other hand it is not possible to know the gender by the ending. It may be a *herba aceras,* a *flos aceras,* a *semen aceras,* &c. To look upon *Aceras* as a neuter because the last element, κερασ, is neuter, is contrary to grammar.

A more difficult example is e.g. *Tricholoma.* Something having the appearance of a hair-fringe, e.g. an alga or a mould, we may call τριχολωμα, *Tricholoma.* As λωμα is neuter, *Tricholoma* must be neuter as well. However, to something having a hair-fringe we can also give the adjectival name *Tricholoma,* from Greek τριχολωμοσ or τριχολωμον, Latin *tricholomus, -a, -um.* The well-known toad-stool *Tricholoma* cannot very well be looked upon as a kind of *loma,* and therefore ought to be considered as feminine, not as neuter.

The same reasoning holds good for all names in *-nema, -stemma, -gramma,* &c. All these names may either be taken as original nouns, and in this case must be considered to be neuter, or they may be taken as converted adjectives, in which case they must unconditionally be looked upon as feminine. To mention an example, the alga *Zygonema* will in all probability have to be taken as neuter, the Angiosperm *Spironema* as feminine, if we are to adhere to grammar.

From the above it becomes sufficiently evident that we cannot tell simply by the ending or by the last element of the compound what gender a name must have according to grammar. For this, knowledge and understanding of the formation of the name is necessary.

Another group of names which especially deserve our attention, are those having a Greek *s*-stem for their last element, as ἀνθοσ, ἀλγοσ, πενθοσ, σκελοσ, εἰδοσ, &c. They again can be either substantival or adjectival. As original nouns they can either end in *-os,* or this ending can be latinised into *-us,* in which case already in classical Latin the masculine gender could be used as well as the neuter gender. As adjectives, however, they must end in -ησ, ησ, -εσ, in Latin *-ēs, -ēs, -ĕs.* So names in *-anthes, -chiles, -penthes, -ides,* &c., are certainly adjectives, names in *-anthos* or *-anthus*, *-chilos* or *-chilus*, &c., certainly nouns, if formed in a grammatical manner. Names in *-anthe*, *-antha*, *-anthon*, *-anthum*, can never be legitimately formed from ἄνθοσ, but at utmost from another word, e.g. ἄνθη.

After this introduction, which is required for a good understanding of the matter, Art. 72 can be dealt with shortly.

The following may be observed: As to its meaning *Andropogon* can be either a transferred noun or a converted adjective. In the first case it must be masculine, like πωγων; in the latter case it is equally possible that it is feminine or neuter. On the same grounds there is no single reason why other names in *-pogon*, and such in *-codon* (κωδων), *-myces* (μυκησ), *-panax* (παναξ), *-stemon* (στημων), should all be masculine. It should first be ascertained whether they are meant as transferred nouns or as converted adjectives, and whether the gender may be recognised by the ending. The names in *-odon* are probably mentioned here by error; although there exists an Ionian variant ὀδων of ὀδουσ, these names are probably adjectival, transcribed from Greek names in -οδον, derived from ὀδουσ, and for that reason neuter. The same considerations hold good for names in *-achne*, *-carpha*, *-cephala*, *-chlamys*, *-daphne*, *-gaster*.

The remark that *Aceras* and *Xanthoceras* were wrongly taken as feminine by Robert Brown, is against all grammar, and is a great injustice to this botanist.

For names in *-dendron*, *-nema*, *-stigma*, *-stoma*, *-anthos*, and *-chilos*, compare what has been said above.

Why *Callicarpa*, and *Polycarpaea*, indeed, must be feminine, *Polycarpon*, *Ormocarpon* and *Pisocarpium* neuter, is also evident from the above.

Summarising what seems to me the result of the above considerations as to the Rules of Botanical Nomenclature, I should like to propose to gather all the grammatical and quasi-grammatical rules into one chapter of grammar that meets the requirements both of botanists with, and of those without a classical training, and to take for a basis, that, equally in the orthography as in the definition of the gender of names, we should follow the first choice of the author for names already formed, but that for names yet to be formed we should as much as possible proceed on classical-Latin lines, and wherever this may be necessary on post-classical lines, but never on lines inconsistent with all grammar.

The late publication, alas, of the rules of nomenclature, agreed upon in 1930, makes it impossible to make more concrete proposals here. The best plan would probably be to leave this question to a committee of botanists who are more or less competent in this matter, and to whom a period of five years should be allowed in order to discuss matters with philologists.

IDENTIFICATION OF SOME MALAYSIAN GRASSES

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When Buse gave an enumeration of the grasses collected by Junghuhn in Java and Sumatra, he mentioned under *Paspalum* a species, described by Retzius in the year 1781 as *Paspalum hirsutum.* Buse identified a grass from Sumatra as being the species of Retzius, on account of the description, having certainly not studied the authentic specimen, which was at that time not easy to consult. It may be that even the work of Retzius was not at his disposal, it is probable that he studied only the description, given afterwards in Lamarck's Encyclopédie. Retzius described his species from China, where it was collected by Bladh. Although the description of Retzius agrees fairly well with Buse's plant, we are in modern times not so satisfied with such an identification, because it is *a priori* not sure at all that the chinese species is identic with a grass from the high plateau of Sumatra, the more because since the description by Retzius and the identification by Buse, such a *Paspalum* was never found in the wide area between China and Sumatra. I therefore carefully studied the type of Retzius at the herbarium of Lund (Sweden), which was kindly forwarded for study from the director at Lund and I compared it with Buse's type, preserved at the Rijksherbarium. The latter is in a very good condition. Already at first sight the two types agree very much especially in the vegetative parts, the number of racemes, their length and general form. In the genus *Paspalum,* a very large one, much weight is given by agrostologists to the form and outline of the spikelets and I will therefore give my opinion on the type of Retzius first. The plant consists of an upper part of the culm with 3 very hirsute leaves and 2 distant racemes. The spikelets have hairy pedicels, the short hairs are sparingly mixed with long ones. The form of the spikelets is obovate-oblong; they are obtuse at the summit and rounded. The first glume (mostly rudimentary in the genus) is wanting the second one, which is very convex, is slightly shorter than the spikelet, minutely punctulate and provided with 5 very strong nerves, a midnerve and two marginal ones, the latter anastomosing upwards and running into the midnerve at the top, which is thickened where the nerves meet. The sterile lemma or third glume is flat and as long as the spikelet; it has 3 strong nerves, a midnerve and 2 submarginal ones, anastomosing at the summit; the true margins are membranaceous and distinctly hairy at the middle, the hairs more or less flexuous or curved. Besides these 3 nerves there are 2 more nerves at a rather broad distance from the midnerve; these two nerves are faint and distinct only at the base of the glume and evanescent upwards, being undulate and giving that part of the glume a scrobiculate, transversely wrinkled appearance. The fruit (fertile lemma) is dark brown and exposed by the shortness of the covering glume. From all these characters it is evident that RETZIUS's plant belongs to a group of species in the genus *Paspalum* called by Mrs. AGNES CHASE the *„plicatula"*. Representative species of this group are the well-known New World *Paspalum plicatulum* MICHX. and the variable Old World species *Paspalum scrobiculatum* L.. The characters of the true *Paspalum hirsutum* are given on my plate, which is an exact copy of the type specimen, the spikelets being magnified 10 times. Returning to BUSE's plant from Sumatra, I indicate here the different characters of the spikelets. Their form and outline is different, they are not only a little longer but more elliptic, not rounded at the summit but distinctly obtusely apiculate; the convex glume is 3-nerved only, the marginal nerves not doubled, the glume is longer than the fertile lemma, obtecting it entirely and protruding above it; the flat sterile lemma is more narrowed upwards too with 3 very distinct nerves and 2 interjecting faint ones, the surface is wrinkled as in the American *Paspalum plicatulum* and the body of the glume is perfectly glabrous. Comparing types and the figures given by me, we see thus that there are distinct differences between the spikelets of the two types and it is therefore evident that we have here two different species. These differences between the two species as to the morphological characters are supported by the very different geographical distribution, the plant described by BUSE being hitherto only known from the prairies of the plateau of Padang lawas in Sumatra. Since BUSE described his species and the characters of the spikelets are given here *in extenso*, it is not necessary to describe BUSE's plant once more. It is named here after the collector Dr HORNER as a species, endemic on Sumatra, the **Paspalum Horneri** HENR. = *Paspalum hirsutum* BUSE, non RETZIUS.

A puzzling plant was described by BUSE in the year 1856 in DE

Vriese's Plantae Indiae Batavae Orientalis as *Streptachne indica.* Buse was an accurate observer and described this plant exactly but he unfortunately overlooked an important character. Having studied his type, a plant collected on Java by Reinwardt, I found that the spikelets have an articulation below the glume and thus easily fall of *in toto.* In the large tribe of the *Agrostideae* to which Buse's plant belongs, this *Streptachne* is thus not a member of the subtribe *Stipeae* as Buse supposed, this subtribe having always an articulation above the glumes which are persistent at maturity. It was thus at once evident that Buse's plant was not a *Steptachme* at all, but more allied with such genera as *Polypogon* and *Chaeturus.* It belongs to the genus *Garnotia* which is already known from Java. Buse's species is placed by me under *Garnotia stricta* Brogn..

Another curious grass was described by Buse in the year 1854 as the endemic *Schizachyrium paradoxum.* He indicated already that his species was allied to the *Schizachyrium brevifolium* (Sw.) Nees. In his monograph of the *Andropogoneae* this species was treated by Hackel, who did not see the plant and remarked only on p. 365: „*ex descriptione videtur A. brevifolii var.*

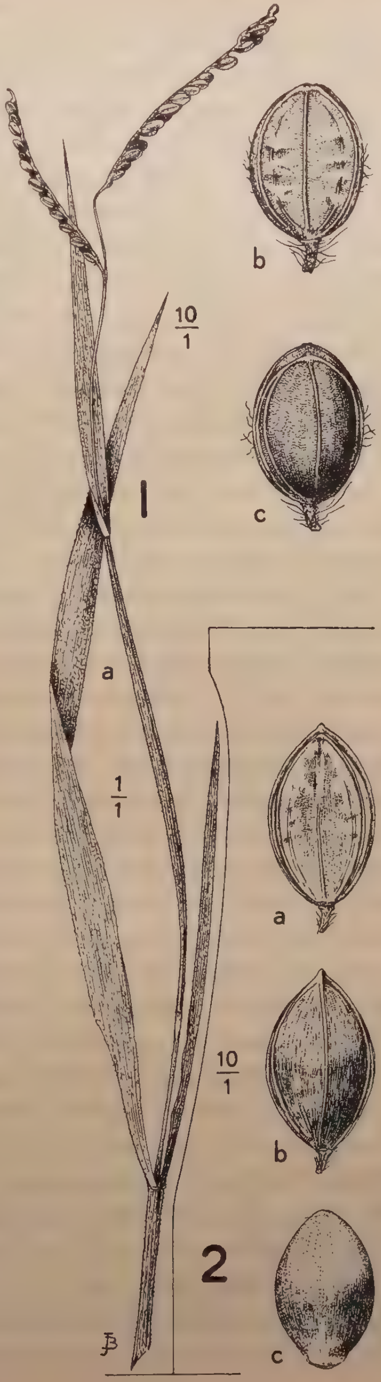

Fig. 1. a. *Paspalum hirsutum* Retz. nat. size; b. spikelet in front, c. id. from the back, both magnified 10 times.

Fig. 2. *Paspalum Horneri* Henr., a. spikelet in front, b. id. from the back, c. sterile lemma, all magnified 10 times.

mutica." BUSE's plant is, however, not simply an unawned *Andropogon brevifolius.* The latter, in its typical form, has a well developed 8—12 mm long awn in the sessile spikelets, which are 3—4 mm long. In BUSE's plants the sessile spikelets are muticous but they are only about 2 mm long; the awn of the pedicelled spikelets in the typical *A. brevifolius* is 4—5 mm long, in BUSE's specimens only about ½ mm long and as long as the spikelet. From a large material of the *Schizachyrium brevifolium* this species is, in accordance with HACKEL's beautiful monograph, characterized by the sessile spikelets, varying in length from 3—4 mm; they have awns from 8—12 mm long, the pedicelled spikelets being reduced to a glume, 1—1½ mm long, which is provided with a more or less distinct awn. Certainly the length of the awns is not a very important taxonomic character, but the length of the spikelets is accepted by agrostologists for discriminating allied species. If we are not willing to accept BUSE's plants as representing a separate species, it has such striking spikelets that this characteristic plant is better acceptable as a subspecies, on account of the very small, only 2 mm long sessile spikelets without an awn; at the same time the pedicelled reduced spikelets are very small (only ½ mm long), but with a distinct subula or awnlet of about the same length. It is noteworthy that this subspecies is hitherto only known from the type locality near Padang, Sumatra's West Coast. BUSE's species has therefore to be named **Schizachyrium brevifolium** (Sw.) NEES subspec. **paradoxum** (BUSE) HENR. nov. subsp.. To this subspecies belong, however, also some interesting plants where the sessile and pedicelled spikelets are both entirely unawned, the only difference between these plants and the authentic *S. paradoxum* being that the reduced pedicelled spikelet, having the same length, is quite muticous. I indicate this form here as a variety of the subspecies *paradoxum,* a variety having a much larger distribution, being known from Tonkin, the Philippine Islands and North Borneo. It is described here as **Schizachyrium brevifolium** NEES subsp. **paradoxum** HENR. var. **inerme** HENR. nov. var.: *Spiculae pedicellatae tabescentes vix ½ mm longae, ad glumam primam muticam redactae.*

Tonkin: collines herbeuses à la base du Mont Bavi, 1 août 1886. B. BALANSA no. 1745 (typus in Herb. Lugd. Bat. sub no. 908.80-111.)
Philippine Islands: Mindanao; Todaya (mount Apo), District of Davao, Oct. 1909. A. D. E. ELMER no. 11939; Mindanao; Bukidnon, Tangculan and vicinity June-July 1920. M. RAMOS et G. EDANO. Herb. Bur. of Science no. 39204.

British North Borneo: Mount Kinabalu, Dallas, 3000 feet, 10 Dec. 1931 J. et M. S. CLEMENS no. 27540. All the specimens mentioned here are preserved in the Rijksherbarium.

STAPF described in the year 1894 *Deschampsia flexuosa* TRIN. var. *ligulata* from British North Borneo. This interesting plant was recently distributed in very beautiful specimens by J. and M. S. CLEMENS from Mount Kinabalu. The typical *Deschampsia flexuosa* is a species of the northern temperate zone. It has a short ligule and a very different aspect. This species is somewhat variable in habit and especially in the higher regions we find a plant described as *Aira montana* by LINNÉ. The latter was observed in Scandinavia and in the Alps of Central Europe and a curious from with very short leaves also in the mountains of Spain. In all these plants the short ligule is about 2 mm long, but the characters of the more condensed panicle somewhat more agree with those of STAPF's variety, which is, as mentioned above, very striking with its remarkable long ligule. The morphological character of the long ligule is used in such grass genera as *Poa, Calamagrostis, Stipa* and others to distinguish different species, which are otherwise not so easy to recognize, so that it is, in my opinion, better to accept STAPF's variety as a distinct endemic Bornean species under the name of **Deschampsia ligulata** (STAPF) HENR. nov. spec..

As to the generic name *Deschampsia,* given by BEAUVOIS for some species described by LINNÉ under *Aira,* I must remark that *Aira,* being a valid name, was published by him with 14 species, the genus being divided by him into „muticae" and „aristatae". After being purified by elimination of species, now accepted as belonging to distinct genera such as *Trisetum* (Aira no. 7), *Koeleria* (Aira no. 2), *Molinia* (Aira no. 3), *Catabrosa* (Aira no. 6), *Periballia* (Aira no. 5) and *Corynephorus* Aira no. 12), the remaining european species form the genus *Aira* sensu stricto. There is no agreement among taxonomists as to the type of the genus *Aira.* Selecting a type arbitrarily, does not solve the problem if *Aira caespitosa* and *Aira caryophyllea* are not considered to be congeneric. The best method is to ask what is LINNÉ's concept of his genus *Aira.* He first used this name in his Flora Lapponica, where 4 species have been described, 3 of them are congeneric, the other one is a species of *Trisetum.* These 3 species, *A. caespitosa, A. flexuosa* and *A. montana* form the basis of LINNÉ's genus *Aira* and it is in this case quite indifferent which of these 3 species is selected as the type of *Aira. Deschampsia* of BEAUVOIS is then only a synonym of *Aira.* I am much in favour of this view and agree with Prof. HITCHCOCK's opinion. In the arrangement of the grasses at the Rijksherbarium, the genus *Deschampsia* is not accepted, the new species is therefore placed there under *Aira* as **Aira ligulata** (STAPF) HENR..

Only one species of the genus *Cenchrus* is found in our Malaysian region. This species is generally known under the name of *Cenchrus inflexus* R. BR. described in the year 1810. This name is, however, not tenable on account of the earlier homonym of POIRET from the year 1804, a quite different species of South America and belonging to a different genus. BROWN's species was therefore renamed by ROEMER and SCHULTES in the year 1817 in Systema Vegetabilium p. 258 as *Cenchrus Brownii.* To this species belongs further the *Cenchrus viridis* SPRENGEL from the year 1825, a name given by American authors to this species, the earlier name being probably overlooked by them. The species, which is widely distributed in the New World from Florida and Mexico to Brazil, is said to be introduced in the Malaysian regions. It may be found in herbaria sometimes as *C. echinatus* L., which is a separate New World species, observed also in Mauritius and the Samoa Islands.

Distribution of Cenchrus Brownii R. et SCH. (as far as represented in the Rijksherbarium).

Annam: Plage maritime à Cameran in 1886 (BALANSA).

Philippine Islands: Manila in 1910 (MC GREGOR in Herb. KNEUCKER exs. no. 833; Luzon in 1915 (MERRILL, Species Blancoanae no. 811).

Selebes: Kp. Koesaeng in 1912 (Exped. VAN VUUREN no. 381).

Ternate: in 1921 (BEGUIN no. 39).

Halmahera: Galèla in 1921 (BEGUIN no. 125, no. 1849).

Seran: G. Pemali in 1917 (Exp. RUTTEN no. 433); island Boano in 1918 (Exp. RUTTEN no. 1300).

New Guinea: River Uta (collector unknown).

Aroe Islands: Dobo in 1922 (danske exped. til Key-Oeerne, JENSEN no. 236).

Timor: ex herb. Paris; without locality leg. ZIPPELIUS).

Java: cultivated in Hort. Bogor. in 1869, TEYSMANN; near Batavia (REINWARDT); id. KUHL and VAN HASSELT).

Australia: collector unknown.

Panama: Culebra Canal zone, HITCHCOCK (Am. Gr. Nat. Herb. no. 622 as *C. viridis*).

Surinam: WEIGELT in 1827 as *C. pungens* H. B. K.; Herb. VAN HALL; HOSTMAN.

This species is represented in the old herb. VAN ROYEN as Cenchrus 2 pr. echinatus.

It is notewhorty that the genus *Cenchrus* is recently sharper distinguished from the genus *Pennisetum*, and a group of *Penniseta* to which belongs *Pennisetum ciliare* LINK, are now recognized as being indeed members of the genus *Cenchrus* on account of the connate rigid bristles or spines at the base of the involucrum. The *Pennisetum ciliare* being a *Cenchrus*, it is evident that the species *Pennisetum Karwinskyi* SCHRAD. is to be placed in the genus *Cenchrus*. For this species we have the name *Cenchrus multiflorus* PRESL, published eight years earlier than SCHRADER's name.

DER BLÜTENSTAND UND DIE BLÜTE VON KORTHALSELLA DACRYDII

von

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Arbeit aus dem Botanischen Institut der Reichsuniversität Groningen.

Als Johannes Christoffer Mekel am 24. Oktober 1934 in Utrecht verschied, hinterliess er Notizen, Präparate und Zeichnungen einer Untersuchung, mit welcher er sich seit seiner Promotion (5. Juli 1933) auf meine Anregung befasst hatte und welche er in der Hauptsache beendigt hatte. Er hatte mir die Ergebnisse schon früher an der Hand seiner Präparate gezeigt und darüber auf der Versammlung des Niederländischen Botanischen Vereins am 7. Juli 1934 kurz berichtet. Die Veranlassung zu dieser Untersuchung und das Hauptresultat teilte ich schon an anderer Stelle (Rec. trav. bot. néerl., 31, p. 758) mit. Obgleich Mekel keinerlei Manuskript hinterlassen hat, und somit die Form dieser Publikation ganz von mir stammt, erachte ich es gleichwohl als meine Pflicht, die von Mekel erzielten Resultate unter seinem Namen zu publizieren.

B. H. Danser.

§ 1. **Das Ziel der Untersuchung** war den Bau des Blütenstandes und der Blüten von *Arceuthobium Dacrydii* Ridley zu ermitteln und festzustellen, ob diese Pflanze wirklich ein *Arceuthobium* ist oder, wie eine oberflächliche Untersuchung des Blütenstandes es vermuten liess, eine *Korthalsella*; und falls letzteres sich wirklich als richtig herausstellen sollte, weiter festzustellen, wie der Bau des Andrözeums dieser Art ist, welches für Arten dieser Gattung von Van Tieghem, Hayata und Lecomte in verschiedener Weise beschrieben wird.

§ 2. **Material und Methode.** Das Material zu dieser Untersuchung stammte von Pflanzen, welche 1931 von Zweigen von *Podocarpus imbricata* Blume im Walde des Naturreservates Tjibodas auf dem Gunung Gedé in Westjava gesammelt wurden, und zwar teilweise von F. W. Went oder C. G. G. J. van Steenis s.n. (vgl. Bull. Jard. Bot. Buitenz., ser. 3, 11, p. 456) und teilweise von W. M. Docters van Leeuwen (No. 14166). Die letzteren wurden freundlichst vom Sammler aus seinen Privatsammlungen zur Verfügung gestellt. Die spezifische Identität mit dem ursprünglichen *Arceuthobium Dacrydii* wurde durch erneute Vergleichung mit dessen Typus, der sich im Besitze des Botanischen Gartens zu Singapore befindet und nochmals gütigst von der Direktion dieses Institutes für unsern Zweck zugesandt wurde, festgestellt.

Von beiden Einsammlungen wurden Stengelspitzen in der gewöhnlichen Weise aus dem Laboratoriumsalkohol über absoluten Alkohol und Xylol in Paraffin übergeführt, dann mit dem Mikrotom auf eine Dicke von 10 μ geschnitten und auf Objektgläser nach Färbung mit Eisenhämatoxylin unter Deckgläsern in Kanadabalsam eingeschmolzen. Es wurden 47 Präparate gewonnen und mit den Nummern 401 bis 447 versehen. Die Präparate 416 bis 447 stammen vom Material Docters van Leeuwen's (Nr. 14166) und sind, weil sie besser waren als die anderen, allein für diese Publikation benutzt worden. Alle werden jetzt in den Sammlungen des Botanischen Laboratoriums der Reichsuniversität Groningen aufbewahrt.

§ 3. Der Bau des Blütenstandes, wie er sich aus den Präparaten herausgestellt hat, stimmt weitgehend mit dem von *Korthalsella,* welche Van Tieghem (Bull. Soc. Bot. Fr., 43, p. 84) beschreibt, überein. Nachdem sich zuerst eine einzige axilläre Blüte gebildet hat, entwickeln sich bald, erst kollateral, dann auch serial, aber immer nur in der Richtung der Braktee, Adventivknospen, welche anfangs in deutlichen Reihen, später aber unregelmässig gestellt sind. Diesen Adventivknospen fehlen selbstverständlich Brakteen, und auch Vorblätter sind nicht anwesend; es finden sich jedoch zwischen den Blüten eigentümliche Haare, welche sogar dann und wann die Zwischenräume zwischen den Blüten gänzlich ausfüllen.

Es zeigt sich jedoch ein einziger wesentlicher Unterschied mit der Beschreibung Van Tieghem's. Während Van Tieghem erwähnt, dass die Blüten der von ihm beobachteten Blütenstände grösstenteils, und dann und wann sogar ausschliesslich, männlich waren, ist bei unserer Pflanze einzig die erste axilläre Blüte männlich, während alle später gebildeten Knospen nur weibliche Blüten liefern. Der Stand des männlichen Perigons ist immer nach $\frac{2}{1}$.

§ 4. Der Bau der männlichen Blüte von Korthalsella nach früheren Untersuchungen. Die männliche Blüte von *Korthalsella* ist zum ersten Mal von Van Tieghem beschrieben worden (Bull. Soc. Bot. Fr., 43, p. 84). Dieser Forscher hat speziell *Korthalsella Remyana* von den Sandwich-Inseln untersucht und beschreibt sie folgendermassen.

„La fleur mâle a trois sépales, orientés diversement suivant les fleurs, le plus souvent suivant $\frac{2}{1}$, parfois aussi suivant $\frac{1}{2}$, avec des positions intermédiaires. Chaque sépale porte à sa base une anthère sessile sans faisceau libéroligneux propre, munie de deux sacs polliniques qui s'ouvrent par deux fentes longitudinales pour mettre en liberté un pollen formé de grains ovales à trois plis."

Von den nahe verwandten Gattungen *Bifaria* und *Heterixia* beschreibt VAN TIEGHEM die Blüten nicht und er erwähnt auch nicht, welche Arten dieser Gattungen er untersucht hat. Er sagt nur, dass die Infloreszenzen und Blüten gar nicht von denen der Gattung *Korthalsella* verschieden sind (l.c. p. 165 und 178). Dies ist der Grund, weshalb ENGLER (Nat. Pflanzenfam., Nachtr., p. 138) die Gattungen *Korthalsella, Bifaria* und *Heterixia* unter dem ersteren Namen vereinigt hat.

Bei dem japanischen *Viscum Opuntia* oder *V. japonicum* THUNB., welches VAN TIEGHEM in seine Gattung *Bifaria* und ENGLER darum in die Gattung *Korthalsella* stellt, beobachtete HAYATA eine andere Struktur und Stellung der Staubblätter und gründete deshalb auf diese Pflanze die neue Gattung *Pseudixus.* Er sagt (Bot. Mag. Tokyo, 29, p. 33): „stamens are arranged alternately to the lobes of the perianth, and anthers are two-celled, perfectly uniting with one another at the center of the flower, but quite free from the perianth-lobes, and bursting when mature in the connate suture or opening with a single central pore." An anderer Stelle (Ic. pl. Formosan., 5, p. 189) gibt er auch Abbildungen von männlichen Blüten, welche auf der Oberseite des Synandriums drei radial verlaufende Spalten zeigen, die sich von der Mitte aus ziemlich weit in der Richtung der Mittelnerven der Tepalen erstrecken. Falls diese Spalten wirklich die Grenzen zwischen den Antheren vorstellen sollten, wie HAYATA es sich anscheinend vorstellt, so würden die Antheren wirklich mit den Perigonlappen alternieren, und es würde dann sogar Grund vorhanden sein, um *Pseudixus* zu einer andern Familie zu stellen.

LECOMTE fand nun, dass weder HAYATA noch VAN TIEGHEM die männliche Blüte von *Korthalsella* richtig beschrieben haben. Er sagt (Bull. Mus. Hist. Nat., 22, p. 262):

„En réalité, la fleur mâle, entourée par trois lobes triangulaires, renferme non pas des étamines libres, mais un synandre hémisphérique composé de six sacs polliniques et occupant le milieu de la fleur, sans aucune connexion avec les lobes. Ce synandre est pourvu, à son sommet, d'un pore par lequel s'échappera le pollen (ce qui est facile de constater sur des fleurs quelque peu avancées). Les sacs sont contigus et soudés à leur base vers le centre; mais plus haut se trouve un intervalle dont le pore occupe le sommet."

„En aucun cas et chez aucun échantillon, même chez des fleurs à lobes largement écartés, je n'ai observé d'étamines séparées, mais toujours et sans exception le synandre dont j'ai déjà parlé."

„Ce synandre étant formé de 6 sacs polliniques (2 par lobe), on comprend qu'il soit loisible à l'observateur, et avec la même raison, d'admettre que ces sacs correspondent deux par deux aux lobes et qu'ils leur sont superposés (van Tieghem), ou bien que les paires correspondent aux intervalles et sont par conséquent alternes avec les lobes (Hayata)."

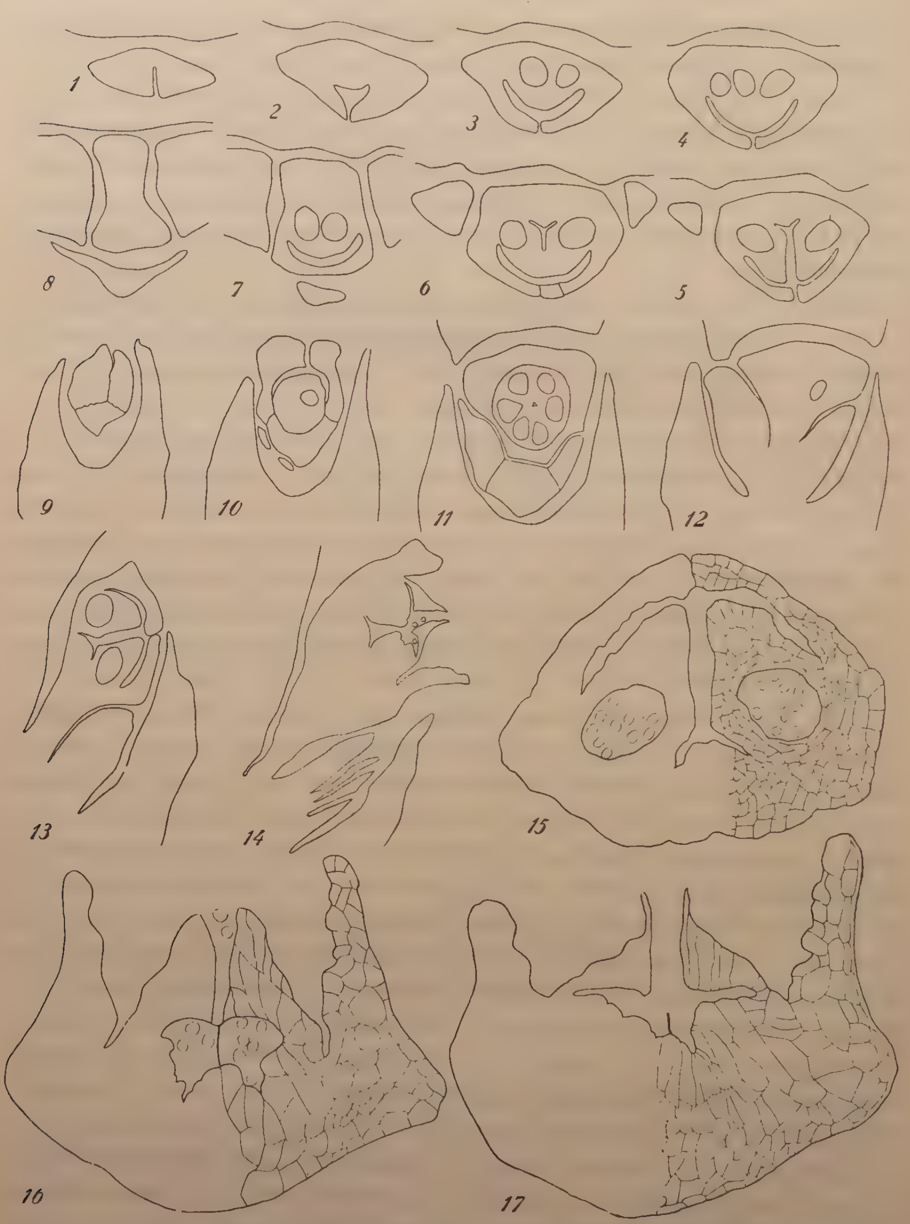
„Sur des sections transversales du synandre j'ai pu observer les cloisons radiales séparant les sacs polliniques, et rien dans la structure uniforme de ces cloisons ne m'a permis d'admettre la possibilité d'une séparation en trois anthères distinctes."

„Le synandre hémisphérique porte, sur toute sa face externe, une assise mécanique sous-épidermique constituée par des cellules dont les épaissements en U présentent leur concavité vers le dehors. Il résulte de cette disposition que la dessiccation provoquée par l'anthère détermine un redressement de la face externe du synandre et, par conséquent, une déchirure de la paroi autour du canal central où manque précisément l'assise mécanique. La sortie du pollen par le pore supérieur se comprend facilement."

§ 5. **Bau der männlichen Blüte nach eigenen Untersuchungen.** Die Frage nach der Struktur der männlichen Blüte unserer Pflanze und nach der systematischen Stellung der Art konnte leicht durch die Anfertigung von vollständigen Reihen von Mikrotomschnitten gelöst werden, von denen einige der instruktivsten auf unserer Tafel dargestellt worden sind. Ein glücklicher Umstand war dabei, dass bei unserer Art in jeder Achsel nur eine mediane männliche Blüte anwesend ist, und dass diese männliche Blüte schief aufgerichtet und mit ihrer Oeffnung wagerecht nach aussen gewandt ist, sodass man auf Längsschnitten der Stengel auch einige fast mediane Längsschnitte der männlichen Blüte, auf Querschnitten des Stengels einige senkrecht darauf stehende Längsschnitte der männlichen Blüte, und auf Tangentialschnitten des Stengels eine schöne Reihe von Querschnitten der männlichen Blüte erhält.

Längsschnitte des Stengels mit Längsschnitten der männlichen Blüte zeigen unsere Figuren 13 und 14, von welchen 13 eine erwachsene Blütenknospe, 14 eine entstäubte Blüte darstellt. In Figur 13 sind 2 der 6 Antherenfächer getroffen, in Figur 14 sind diese Antherenfächer schon verschwunden und ist die apikale Oeffnung des Synandriums deutlich sichtbar.

Die Figuren 1 bis 8 sind Querschnitte durch einen achselständigen



Korthalsella Dacrydii. Fig. **1—8**, acht Querschnitte durch eine blütentragende Blattachsel (Präp. 446, Reihe E, Schnitte 8, 13, 16, 19, Reihe F, Schnitte 4, 7, 13, 18); **9—12**, vier Tangentialschnitte durch eine blütentragende Achsel (Präp. 416, Reihe B, Schnitt 12 links und 15 links, Reihe C, Schnitt 6 und 11); **13**, Radialschnitt durch eine blütentragende Achsel mit erwachsener männlicher Blütenknospe (Präp. 416, jungen Blütenstand, dessen männliche Blüte noch nicht geöffnet ist. Die Figuren 1 und 2 gehen durch die 2 hinteren Perigonlappen, 3 bis 7 durch die Antherenfächer, 5 mitten durch das Synandrium, 8 durch den Blütenstiel.

Die Figuren 9 bis 12 sind Tangentialschnitte durch einen Blütenstand und zeigen Querschnitte durch die männliche Blüte. Die Figuren 9 und 10 sind instruktiv für den Bau des Perigons, 11 für die Lage der 6 Antherenfächer und der zentralen Höhle des Synandriums, 12 für die Einpflanzung der Blüte. Die Dreieckigkeit der zentralen Pore in Figur 11 weist darauf hin, dass die Antheren den Perigonlappen superponiert sind.

Die Figuren 15 bis 17 geben weitere Einzelheiten betreffs des Verhaltens der Antherenfächer in verschiedenen Stadien ihrer Entwicklung. Es ist einleuchtend, dass aus so kleinen Fächern mit so kleiner gemeinsamer Ausmündung die verhältnismässig grossen Pollenkörner nicht leicht herauskommen können. Es zeigt sich nun, dass dies durch die Formänderung der Antherenfächer gefördert wird. Während nämlich die nach der Mitte der Blüte gekehrte Wand der Fächer einschrumpft, wölbt sich die Aussenwand empor und drückt den Pollen in die zentrale Höhle. Das Emporwölben der Aussenwand wird durch die Verlängerung der umliegenden Parenchymzellen verursacht. In Figur 15 sind diese Zellen mit Bezug auf das Fach tangential gestreckt, in Figur 16 ungefähr isodiametrisch, in Figur 17 deutlich radial gestreckt.

Aus obigem ist ersichtlich, dass die männliche Blüte unserer Pflanze mit der *Korthalsella*blüte, wie Lecomte sie beschreibt, fast genau übereinstimmt und dass unsere Pflanze also kein *Arceuthobium*, sondern eine *Korthalsella* ist. Die Umbenennung von *Arceuthobium Dacrydii* Ridley zu *Korthalsella Dacrydii* (Ridl.) Danser hat inzwischen schon an anderer Stelle stattgefunden (Rec. trav. bot. néerl., 31, p. 759).

Die Entdeckung des Auswachsens der Zellen der Antherenfächerwände in der Richtung der apikalen Pore des Synandriums vervollständigt sehr schön, was Lecomte betreffs der Ursache des Aufspringens der Antherenfächer mitteilt.

Reihe C, Schnitt 12 links); **14**, dasselbe mit geöffneter männlicher Blüte (Präp. 418, Reihe B, letzter Schnitt); **15—17**, Längsschnitte durch männliche Blüten verschiedenen Alters, die Zellen teilweise eingezeichnet, um die Volumzunahme und das Vollwachsen der Antherenfächer zu zeigen; **15**, erwachsene Knospe (Präp. 446, Reihe F, Schnitt 4), **16**, geöffnete Blüte (Präp. 424, Reihe F, Schnitt 17), **17**, entstäubte Blüte, deren Antherenfächer grössenteils von den verlängerten Wandzellen ausgefüllt sind (Präp. 434, Reihe B, Schnitt 11). Fig. 1—14 104 ×, Fig. 15—17 stärker vergrössert.

§ 6. **Bemerkung über die weibliche Blüte.** VAN TIEGHEM beschreibt die weibliche Blüte von *Korthalsella* vollständig (l.c. p. 85—86), und die von ihm beschriebene Struktur ist im allgemeinen für unsere Pflanze als richtig befunden worden. Besonders muss jedoch erwähnt werden, dass in den erhaltenen Präparaten auch die höchst eigentümlichen und merkwürdigen U-förmigen Embryosäcke hier und da sehr deutlich zu erkennen waren, mit dem einen Ende in der zentralen Parenchymmasse des Ovars, mit dem andern in der Fruchtknotenwand gelegen. Diese Uebereinstimmung bestätigt zum Ueberfluss die Zugehörigkeit unserer Pflanze zur Gattung *Korthalsella.* Dies ist darum von besonderer Bedeutung, weil HAYATA dies für seinen *Pseudixus japonicus* bestimmt verneint (Ic. pl. Formos., 5, p. 187, 188).

§ 7. **Zusammenfassung der Resultate.** Als Endresultat unserer Untersuchung ist die Tatsache festzustellen, dass die als *Arceuthobium Dacrydii* von RIDLEY beschriebene Pflanze kein *Arceuthobium,* sondern eine *Korthalsella* ist, wie es die Struktur des Blütenstandes (§ 3), der Blüten (§ 5 und 6) und des Andrözeums (§ 5) der untersuchten Art beweisen; letzteres stimmt mit der Beschreibung, welche LECOMTE gibt, überein, wenn er sagt, das Andrözeum sei aus 3 bilokulären Antheren zusammengestellt, welche so innig miteinander verwachsen sind, dass nicht mehr festzustellen sei, ob wir es mit 3 den Perigonlappen alternierenden oder diesen superponierten Antheren zu tun haben. Die Dreieckigkeit der apikalen Pore in gewissen Querschnitten (§ 5 und Fig. 11) ist jedoch ein von LECOMTE nicht beobachteter Hinweis darauf, dass wir es doch mit den Perigonabschnitten superponierten Antheren zu tun haben und dass in dieser Hinsicht also unsere *Korthalsella* eine richtige Loranthacee ist. Ein weiteres Resultat ist die Entdeckung des Auswachsens der Parenchymzellen der Antherenfächerwände, welche die Herausbeförderung des Pollens aus dem Synandrium zu erklären hilft.

Nach allem ist jedoch noch durchaus nicht klar, woher die Unterschiede in den Beschreibungen des Andrözeums von VAN TIEGHEM, HAYATA und LECOMTE stammen. VAN TIEGHEM war ein ausserordentlich genauer und geübter Beobachter, und es ist kaum anzunehmen, dass er die Verwachsung der Antheren übersehen oder sie zu beschreiben vergessen haben sollte. HAYATA's Beschreibung und Figuren sind so unzweideutig, dass man zwar ihre Interpretierung in Abrede stellen, die ihnen zugrunde liegenden Beobachtungen jedoch kaum bezweifeln kann. LECOMTE behauptet nachdrücklich, dass er kein einziges Mal eine Trennung zwischen den Antheren gefunden habe, welche die Alternanz oder Superposition der Staubfäden sicherstellen würde. Dass er ferner seinen

Beobachtungen die japanische Pflanze nicht ausschliesst, ist daraus ersichtlich, dass er in seiner systematischen Uebersicht unter den Synonymen von *Korthalsella moniliformis* (Wight) Lec. (l.c. p. 265) auch *Viscum japonicum* Thunb. erwähnt.

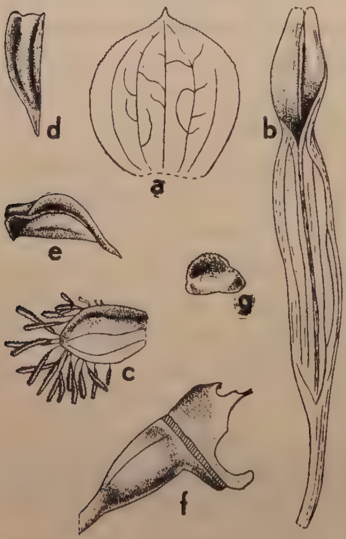
Eine Lösung dieser Frage an der Hand der Literatur ist darum unmöglich, weil weder Van Tieghem noch Lecomte genau und vollständig erwähnen, welche Materialien ihren Untersuchungen zugrunde lagen. Van Tieghem gibt zwar genau an, welche Pflanze er für die Begründung seiner Gattung *Korthalsella* benutzte, dasselbe unterlässt er aber für seine Gattungen *Bifaria* und *Heterixia*; wir wissen also nicht, ob Van Tieghem je das Andrözeum und die Embryosäcke der allbekannten japanischen Art untersucht hat. Bei Lecomte, dessen Befunde weitaus am besten mit den unsrigen übereinstimmen, ist die Herkunft des Materials völlig unerwähnt geblieben. Es ist einleuchtend, dass eine weitere vergleichende Untersuchung von Arten aus dieser Verwandtschaft keineswegs überflüssig genannt werden kann.

AN INTERESTING NEW BULBOPHYLLUM

by

J. J. SMITH

(Oegstgeest).



Bulbophyllum Jacobsonii J. J. S.
a. Sepalum dorsale.
b. Sepala lateralia.
c. Petalum.
d—e. Labella.
f. Gynostemium.
g. Anthera.

Bulbophyllum (sect. Cirrhopetalum) **Jacobsonii** J. J. S. n. sp. — Rhizoma repens, teres. Pseudobulbi remoti, oblique ovoidei, manifeste quadranguli cum lateribus concavis, 1.8 cm longi, 0.75 et 0.95 cm diam., 1-folii. Folium lanceolatum, apice recurvulum, basi brevissime conduplicato-petiolato-acuminatum, costa media supra sulcata subtus leviter obtuse prominente, carnoso-coriaceum, 9.5 cm longum, 2.9 cm latum. Inflorescentia e basi pseudobulbi, adscendens, folio paulo brevior, subumbellata, c. 4-flora, pedunculo tenui, tereti, apicem versus sensim leviter incrassato, bene 10 cm longo, basi nonnullis vaginulis tubulosis, infra medium vaginula magnam partem tubulosa subulato-apiculata 0.75 cm longa donato. Bracteae convolutae, inexpansae subulatae, expansae lanceolato-triangulae, usque 0.8 cm longae. Flores conspicui. Sepalum dorsale valde concavum, expansum suborbiculare, brevissime abrupte acuminatum, acutum, basi latum, praesertim versus apicem dense minute conico-papilloso-ciliolatum, 5-nervium, c. 1 cm longum, 0.75 cm latum. Sepala lateralia pedi gynostemii inserta, elongata, marginibus proximis valde incurvis inferne longitudine c. 1.8 cm conglutinata et plicam introrsam alte cariniformem formantia ceterum libera, marginibus exterioribus basi longitudine c. 0.6 cm liberis fenestram formantibus deinde incurvis et omnino conglutinatis laciniam magnam partem convexam formantia, marginibus angustissime tegentia, oblique linearia, apice deficiente, basi leviter contracta, 5-nervia, 10 cm superantia, expansa una 0.73 cm lata. Petala parva, verticalia, porrecta, oblique subquingulari-elliptica, obtusa, bene dimidio superiore appendicibus (c. 27) clavatis obtusis basi brevissima filiformi excepta papillis patentissimis obtusis dense vestitis basin versus decrescentibus fimbriata, 3-nervia, 0.35 cm longa, fere 0.3 cm lata, absque fimbriis 0.225 cm longa, 0.175 cm lata, fimbriis usque 0.15 cm longis. Labellum parvum, mobile, subrectum, $^{2}/_{5}$ partibus superioribus vix obtusangule recurvum, carnosum, glabrum, supra visum anguste triangulum, parte mediana longitudinaliter convexa basi abrupte humili, margine angusto patente basin versus dilatato, marginibus apice recurvulis paululum acuminatum, satis acutum, subtus crasse carinatum cum canalicula, basi truncatum, 0.3 cm longum, 0.12 cm latum. Gynostemium breve, crassum, leviter lateraliter compressum, marginibus obtusangule dilatatis, 0.2 cm longum, clinandrio alte excavato, pariete postico recurvulo truncato, auriculis porrectis clinandrium bene superantibus, oblique lanceolatis, setiformi-acuminatis. Anthera alte cucullata, supra visa subobovata, apice rotundata, basi leviter emarginata, connectivo valde incrassato celluloso-papilloso, 0.12 cm longa. Pes gynostemii cum ovario angulum obtusum faciens, incurvus, oblongus, truncatus, carnosus, canaliculatus, apice a sepalis lateralibus liber, 0.2 cm longus. Ovarium obconicum, 6-sulcatum, 0.23 cm longum, cum pedicello multo tenuiore 0.2 cm longo clavatum, minute furfuraceo-punctatum.

Sumatra: West coast, Soengai Dareh, 1000 m. (A. V. Theunissen, August 1924, cult. in Hort. E. Jacobson sub n. 2202 et in Hort. Bog. sub n. 933. II. 11).

The nearest ally of this remarkable species is *B. mirum* J. J. S. from which it differs in the much longer peduncled, more-flowered inflorescences, the much larger flowers and differently shaped petals the appendages of which are densely covered with papillae. The proximate margins of the lateral sepals cohere in the basal portion and are free upwards; the exterior margins, on the contrary, are free at their base and cohere higher up so as to form a convex blade. In the cavity at the base the lip protrudes. The species demonstrates once more that a genus *Cirrhopetalum* cannot be upheld.

Dr. Jacobson describes the colours as follows:

„Pseudobulbs green; leaves light green, waxy; peduncle greenish with purple, streaklike dots; bract greenish purple punctate; dorsal sepal greenish white dotted purple outside; lateral sepals light purple beneath greenish white at the base, inside light purple with a whitish

hue; petals greenish white fringed blackish purple; lip greenish white densely dotted light purple above, minutely punctate purple beneath; column transparently white with purple markings at the base; stigma greenish white; anther transparently white; pollinia pale yellow; ovary brownish white, pedicel greenish white, both purple dotted."

Description from a pseudobulb and an inflorescence preserved in alcohol. The tips of the lateral sepals were damaged.

THE MALAYSIAN GENUS RIGIOLEPIS HOOKER F.

by

J. J. SMITH

(Oegstgeest).

The Ericaceous genus *Rigiolepis* was founded by Sir JOSEPH D. HOOKER (Ic. plant. third ser. II (1876), 54, pl. 1160) on a single species from Borneo, viz. *R. borneensis* HOOK.F. HOOKER was not quite sure about some of the characteristics, and failed to compare it with *Vaccinium* to which genus, indeed, several authors have reduced it.

In 1914 I have discussed the *Rigiolepis* question (in Ic. Bog. IV, 68) in the note under *Vaccinium uniflorum* J. J. S. and was inclined to believe that *Rigiolepis* should be maintained as a distinct genus, although my material was not sufficient to solve the question definitely. Since I have studied many other species of this affinity and I do not hesitate to accept the genus.

H. N. RIDLEY (in Kew Bull. 1922, 106) maintains the genus also but was evidently not fully convinced of the correctness, for he says: „Several botanists have reduced the genus to *Vaccinium* but in its epiphytic habit, extra-axillary racemes, and very small flowers it is so different from typical species of *Vaccinium* that I should be unwilling to include it in that genus; if referred to *Vaccinium*, however, it and the following new species should be placed in a distinct subgenus." This argumentation I cannot participate for the characteristics summed up would not separate *Rigiolepis* from *Vaccinium.* The epiphytic habit is a very common phenomenon in *Vaccinium.* Extra-axillary racemes, so far I know the species, do not occur in *Rigiolepis* (slightly supra-axillary in *R. Endertii*) nor in *Vaccinium* but the inflorescences are produced in the leaf-axils or in the axils of fallen leaves in both genera, and smallness of the flowers can be left out of consideration as they differ, also in *Vaccinium,* considerably in size.

RIDLEY l. c. emphatically excluded *Vaccinium acuminatissimum* MIQ. from *Rigiolepis,* for he says: „By some curious error MERRILL has reduced *Rigiolepis borneensis* to *Vaccinium acuminatissimum* MIQ., with which it has nothing in common" *). I do not understand what should be the criterium; in my opinion both species are most closely related.

H. F. COPELAND l. c. remarks, although he has apparently not seen material, that it is possible that *Rigiolepis* should be maintained as a genus „but at least neither the genus nor the species is far removed from others."

In my opinion *Rigiolepis* is sufficiently characterized by the stamens and the ovary. The stamens have in general the shape of those of *Vaccinium*; the filament is linear and often pubescent, the anther is dorsifix, produced in two moderate tubes and provided on the back with two spurs. They differ in the tubes tapering towards the apex, somewhat in the way of *Dimorphanthera*, and open by a long, longitudinal, cleftlike, introrse pore. The ovary is 10-celled, with the septa similar, complete and thin. The leaves are usually long acuminate and distinctly 3—7-plinerved but sometimes the basal nerves are rather inconspicuous so that the leaves are rather penninerved. The racemous inflorescences, as pointed out above, are produced in the leaf-axils or in the axils of fallen leaves, few- or many-flowered, rarely reduced to a single flower, solitary or fascicled, usually more or less puberulous. The bracts, bracteoles and sepals are sometimes strongly nerved. The flowers are small or very small.

There is another small group of species that perhaps best would be referable here, viz. some species of *Agapetes*. *Agapetes* as generally interpreted is a heterogenous genus. I agree with COPELAND that the nearest allies of *Agapetes setigera* D. DON may constitute a tenable genus. The others, principally Malayan, *A. Griffithii* CLARKE, *A. perakensis* RIDL., *A. micrantha* RIDL., *A. Wrayi* RIDL., *A. pubescens* RIDL. and perhaps others, so far I know, differ in the corolla, quite different stamens and the 10-celled ovary. The only species I know, is the one of which I described a monstrous form with separate petals under the name of *Vaccinium dialypetalum* (in Ic. Bog. IV (1912), 99, t. CCCXXXI). Normal specimens of what I believe to be the same species were collected in Sumatra, a.o. on Kerintji-Peak. In *V. dialypetalum* the anthers are laterally cohering, which character it has in common with the true *Agapetes*-species. I do not know if it holds good also for the normal flower. The species from Kerintji-Peak was enumerated by RIDLEY in his Kerintji-list (in Journ. Fed. Mal. St. Mus. VIII (1917), 56) under the name of *A. Griffithii* CLARKE, but in 1932 in a

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*) See H. F. COPELAND in Phil. Journ. Sc. XLVII (1931), 104.

letter Mr. RIDLEY kindly informed me that the Kerintji plant is *A. pubescens* RIDL. I suppose that the Javanese species also belongs here. Although the plants in question have much in common with *Rigiolepis*, I do not merge them in that genus because my knowledge of them is insufficient.

Rigiolepis HOOK.F.

HOOK.F. Ic. Plant. 3rd ser. II (1876), 54, t. 1160; DRUDE in ENGL. u. PR. Nat. Pfl.fam. IV, 1 (1897), 49; J. J. S. in Ic. Bog. IV (1914), 68; in KDS. et VAL. Bijdr. 13 Booms. Java (1914), 145; RIDL. in Kew Bull. 1922, 106; H. F. COP. in Phil. Journ. Sc. XLVII (1932), 103.

Calyx 5-partitus, laciniis persistentibus. Corolla urceolata, 5-loba, lobis in praefloratione imbricatis. Stamina 10, inclusa, aequalia, circa discum inserta, filamentis corollae basi leviter adnatis, plerumque undatis pilosisque, antheris liberis, dorsifixis, in tubulos 2 mediocres vel satis longos apicem versus attenuatos poro conspicuo longitudinali rimiformi introrso hiantes productis, dorso bicalcaratis. Ovarium inferum, cum pedicello articulatum, 10-loculare, septis aequalibus, tenuissimis, completis; stylus columnaris, stigmate parvo truncato. Bacca calyce discoque coronata, 10-locularis. Semina in loculis 1—3, satis conspicua.

Fructices plerumque epiphytici, saepe pubescentes. Folia alterna, breviter petiolata, integerrima, supra basin utrinque glandula marginali instructa, saepissime distincte raro indistincte 3—7-plinervia. Inflorescentiae axillares vel in axillis foliorum delapsiorum, raro paululum supra-axillares, racemosae, pauci-multiflorae, raro floribus ad unum reductis, solitariae vel fasciculatae, plerumque secundae, foliis multo breviores, saepe puberulae. Flores parvi vel parvuli, saepe puberuli et minute muriculati, pedicellati, pedicello bracteolato.

The genus as here interpreted is confined to Java, Sumatra and Borneo; the majority of species originate from the latter island.

The following species should be reckoned to it. I am acquainted with more species but the material at hand is not good enough to describe them. On the other hand some of the species enumerated below may prove, when good materials are available, identical with others.

Rigiolepis borneensis HOOK.F. Ic. pl. XII (1876), 54, t. 1160; COPEL. in Phil. Journ. Sc. XLVII (1932), 103; RIDL. in Kew Bull. 1922, 106. — *Vaccinium borneense* W. W. SM. in Notes Bot. Gard. Edinb. VIII (1915), 329. — *V. acuminatissimum* MERR. (non MIQ.) in Journ. Str. Br. R. As. Soc. Spec. numb. (1921), 465.

Frutex ramulis plus minusve dense hirto-puberulis, inferne squamis triangulo-subulatis interdum leviter foliaceis rigidis pungentibus dorso valde prominenter nervosis puberulis c. 0.2—1 cm longis inspersis. Folia alterna, breviter petiolata, elliptica ad lanceolata vel plus minusve ovata, acuminata vel longe acuminata, acutiuscula vel obtusa, basi acuta vel interdum obtusa, integerrima, margine recurva, glandula marginali impressa utrinque supra basin, adulta nervis supra subtusque praesertim versus basin puberulis exceptis glabra, interdum subglabrescentia, 5-plinervia, nervis valde adscendentibus, longissimis fere usque apicem productis, exterioribus interdum inconspicuis, supra in canaliculis tenuiter prominentibus subtus valde prominentibus, curvatis, intra marginem anastomosantibus, venis transversis curvatis connexis, reticulo venarum sicco utrinque prominente, supra inter nervos et interdum etiam inter venas valde convexa, coriacea, nitida, c. 7.5—15 cm longa, 1.75—5.5 cm lata; petiolus puberulus, c. 0.3—0.5 cm longus. Inflorescentiae axillares, solitariae, breves, satis multi- vel satis pauciflorae, sessiles, 1—2.2 cm longae, squamis densis imbricantibus subulatis vel triangulo-subulatis rigidis pungentibus puberulis ad basin, rachide villosulo-pubescente. Bracteae patentes, ovatae, acutae vel acuminatae, valde concavae, dorso valde prominenter nervosae, puberulae, longius ciliatae, c. 0.25—0.275 cm longae. Flores parvi, breviter pedicellati, pedicello tereti, puberulo, cum ovario articulato, 0.23—0.26 cm longo, bracteolis 2 oppositis incurvis ovato-lanceolatis acuminatis acutis concavis puberulis ciliatis nervis 3—5 validis dorso prominentibus rigidis c. 0.17—0.2 cm longis supra vel infra medium. Calyx 5-partitus, laciniis adpressis, ovato-triangulis vel oblongo-ovato-triangulis, acutis, dorso puberulis, ciliatis, dorso valde prominenter 3-nerviis, inter nervos semipellucidis, c. 0.175 cm longis, 0.075—0.1 cm latis. Corolla subovoideo- vel subovali-urceolata, basi apiceque valde contracta, 5-angulato-lobata, apice 5-lobata, puberula, c. 0.225—0.26 cm longa, 0.2—0.225 cm diam., lobis recurvis, triangulis, convexis, dorso puberulis, c. 0.04 cm longis. Stamina 10, 0.16—0.2 cm longa; filamentum lineare, papillosum, 0.07 cm longum; anthera dorsifixa, oblongo-ovato-triangula, apicem versus angustata, basi obtusissima retusa, circiter usque ad medium in tubulis 2 leviter incurvulis contiguis erectis apicem versus attenuatis obtusis poro introrso longissimo sublineari hiantibus fissa, tubulis exceptis minute echinulata, 0.075 cm longa, calcaribus 2 conspicuis erecto-patentibus incurvulis subulatis minute echinulatis c. 0.04 cm longis dorso ad basin tubulorum. Ovarium semiglobosum, patenter pubescens, c. 0.075 cm altum, 0.125 cm diam.; stylus teres, versus apicem vix incrassatus, truncatus, glaber, c. 0.2 cm longus. Discus annulari-disciformis, margine minute lobulatus, puberulus, 0.06 cm diam. Fructus brevissime pedicellatus, laciniis calycis triangulis 0.3—0.325 cm longis discoque excavato coronatus, globosus, pubescens, maceratus c. 0.45 cm diam., 10-locularis, septis omnibus tenuibus. Semina 1—2 in loculis, compressa, oblonga, plus minusve triangula, interdum falcatula, reticulata, c. 0.16—0.17 cm longa.

Borneo: Sarawak (Native collector nrs. 1160!, 1748!, 1956!). Mt. Poi. (J. and M. S. CLEMENS n. 21962!, 8 October 1929). Mt. Matang, 700 m. (J. and M. S. CLEMENS n. 20992!, October 1929). Matang Road (Native collector DABONG nrs. 729!, 1503!). Kuching. (G. D. HAVILAND and C. HOSE n. 1020!, 27 August 1894). Wester Afdeeling. (JAHERI!, without locality and number). Boekit Singkadjang. (J. E. TEYSMANN n. 8149!). Landak Ngabang. (J. E. TEYSMANN nrs. 11514!, 11555!). Between Soengai and Goenoeng Kenepai. (H. HALLIER nrs. 1488!, 1937!, 1893—'94). Goenoeng Kelam. (H. HALLIER n. 2339!, 1893—'94). Mandor, 50 m. (E. POLAK n. 219!, 11 December 1930).

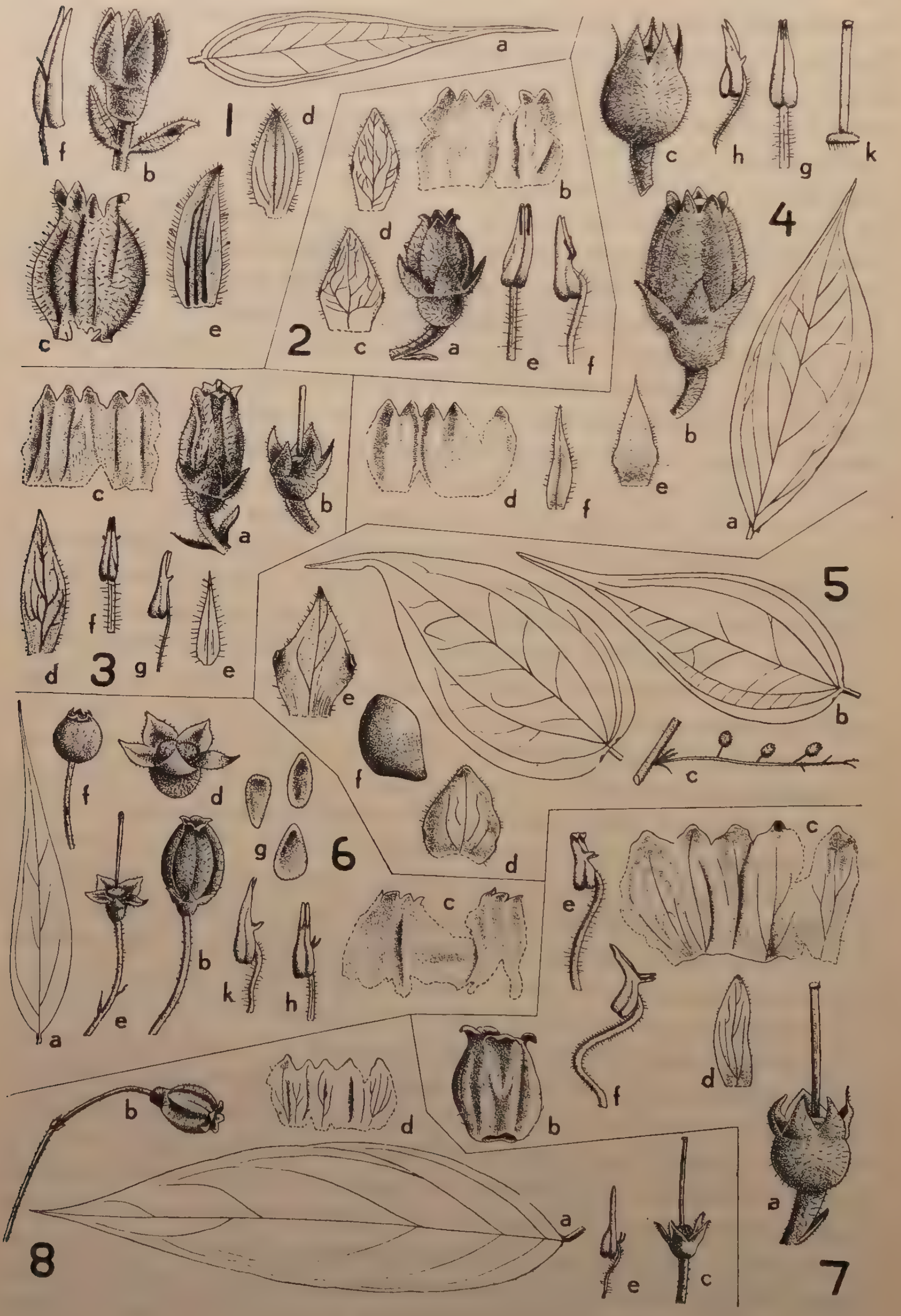
The type species has been collected repeatedly and is evidently not rare in Borneo. It is well characterized by the leaves, the manyflowered dense inflorescences and the strongly nerved bracts, bracteoles and sepals.

Among the material collected by the native collector JAHERI there are specimens with very short inflorescences and others with longer pedicelled flowers than usual.

Description from herbarium.

Rigiolepis poiana J. J. S. n. sp. Fig. 1, a—f.

Frutex ramulis longis tenuibus patentissime hirsutulis, ramentis filiformi-subulatis sicco prominenter nervosis puberulis usque c. 0.55 cm longis. Folia alterna, brevissime petiolata, ovato-lanceolata, sensim longissime caudato-acuminata, angustissime obtusa, breviter acuta, apice cartilaginea, basi rotundata vel obtusa, margine sicco recurvula, glandula marginali prominula impressa utrinque supra basin, adulta in nervis principalibus praesertim basin versus villosulo-hirsutula, 5-plinervia, ceterum plerumque nervis lateralibus patentibus tenuibus intra marginem anastomosantibus 2 vel pluribus utrinque, costa media supra in canalicula prominula subtus bene prominente, nervis basilaribus praesertim in foliis adultis basi supra in canaliculis prominulis, ceterum cum reticulo venarum supra subtusque prominulis, praesertim superioribus valde adscendentibus, coriacea, c. 5.5—10 cm longa, 1.3—2.1 cm lata, cauda 1.1—3.25 cm longa; petiolus hirsutulus, ad c. 0.4 cm longus. Inflorescentiae axillares, ut videtur plerumque solitariae, subsessiles, laxe c. 15-florae, nonnullis squamis subulatis hirsutulis ad basin, rachide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patentissime hirsutula, 4.25—6 cm longa. Bracteae ovatae, saltem inferiores acuminatae, concavae, hirsutulae, dorso prominenter nervosae. Flores pedicellati, pedicello crassiusculo, tereti, patentissime pubescente nonnullisque pilis clavatis ad apicem insperso, 0.25 cm longo, bracteolis 2 oppositis patentibus ovato-oblongis apiculatis concavis utrinque hirtello-puberulis in margine nonnullis pilis clavatis inspersis 3-nerviis firmis fere 0.3 cm longis 0.1 cm latis in medio pedicelli. Calyx 5-partitus, adpressus, laciniis oblongo-ovatis, apicem versus angustatis, acutiusculis vel obtusiusculis, utrinque pubescentibus, ciliatis, nonnullis pilis brevioribus clavatis in margine inspersis, 0.3 cm longis, 0.12 cm latis. Corolla urceolata, 5-angulato-lobata, basi fauceque contracta, apice 5-loba, intus extusque dense hirtello-puberula, extus nonnullis pilis clavatis inspersa, macerata 0.45 cm longa, lobis triangulo-ovatis. Stamina 10, 0.275 cm longa; filamentum lineare, papillosum; anthera supra basin dorsifixa, parte inferiore oblonga basi obtusissima lobulata echinulata, thecis antice sulco separatis sulco laterali instructis, in tubulos 2 erectos contiguos rectos apicem versus attenuatos producta, calcaribus 2 conspicuis filiformi-subulatis 0.05 cm longis ad basin tubulorum, tota 0.225 cm longa, tubulis c. 0.125 cm longis. Ovarium cum pedicello articulatum, bene semiglobosum, dense patentissime hirtello-pubescens, c. 0.1 cm altum, cum calyce fere 0.4 cm longum; stylus sepala superans, teres, glaber, 0.3 cm longus. Discus pulvinatus, hirtellus.

Borneo: Sarawak, Mt. Poi, 1700 m. (F. W. FOXWORTHY n. 395! (type), 3 June 1908). Same locality, 1300—1500 m. (J. and M. S. CLEMENS nrs. 6779!, 20006!, 20019!, 20043!, 22589!, September 1829).

Explanation of the plate.

Fig. 1. *Rigiolepis poiana* J. J. S. *a.* Folium. *b.* Flos absque corolla. *c.* Corolla. *d.* Bractea. *e.* Bracteola. *f.* Stamen. — Fig. 2. *Rigiolepis lanceolata* (Bl.) J. J. S. f. *sumatrana*. *a.* Flos. *b.* Corolla explanata. *c, d.* Bracteae. *e, f.* Stamina. — Fig. 3. *Rigiolepis lanceolata* (Bl.) J. J. S. f. *marapiensis*. *a.* Flos. *b.* Calyx et pistillum. *c.* Corolla explanata. *d.* Bractea. *e.* Bracteola. *f, g.* Stamina. — Fig. 4. *Rigiolepis lanceolata* (Bl.) J. J. S. f. *elliptica*. *a.* Folium. *b.* Flos. *c.* Fructus. *d.* Corolla explanata. *e.* Bractea. *f.* Bracteola. *g, h.* Stamina. *k.* Pistillum. — Fig. 5. *Rigiolepis Korthalsii* J. J. S. *a, b.* Folia. *c.* Racemus fructifer. *d, e.* Bracteae. *f.* Semen. — Fig. 6. *Rigiolepis salicifolia* J. J. S. *a.* Folium. *b.* Flos. *c.* Corolla explanata. *d.* Calyx cum ovario. *e.* Flos absque corolla. *f.* Fructus. *g.* Semina. *h, k.* Stamina. — Fig. 7. *Rigiolepis Endertii* J. J. S. *a.* Pistillum. *b.* Corolla. *c.* Idem, explanata. *d.* Bractea. *e.* Stamen minus. *f.* Stamen majus. — Fig. 8. *Rigiolepis filiformis* J. J. S. *a.* Folium. *b.* Flos. *c.* Flos absque corolla. *d.* Corolla explanata. *e.* Stamen.

I think that the collections cited above belong together, though good flowering material is lacking; only on the type there is a flower which, however, had already been examined by Dr. MERRILL. The type differs from the specimens collected by Mr. and Mrs. CLEMENS in the larger leaves and longer and laxer inflorescences, just as if this specimen was collected on a more shady spot.

The species differs from *R. borneensis* HOOK.F. in the much smaller, differently shaped leaves, the very hairy inflorescences and flowers, larger flowers.

Description from herbarium.

Rigiolepis lancifolia RIDL. in Kew Bull. 1922, 107.

Borneo: Sarawak, near Quop. (G. D. HAVILAND n. 619). Mount Start, 540 m. (G. D. HAVILAND n. 1462).

Rigiolepis Lobbii RIDL. in Kew Bull. 1922, 107.

Borneo: Sarawak, 900 m. (TH. LOBB).

Rigiolepis uniflora J. J. S. nov. comb. — *Vaccinium uniflorum* J. J. S. in Ic. Bog. IV (1910), 67, t. CCCXX.

Borneo: Wester-Afdeeling, Amai Ambit. (H. HALLIER n. 3296!, (type), 1893—'94).

This species without doubt belongs to *Rigiolepis.*

RIDLEY compares his *Vaccinium monanthum* with *R. uniflora* J. J. S. It is quite possible that that species belongs also in *Rigiolepis,* but as I have no certainty I do not remove it from *Vaccinium.*

Rigiolepis lanceolata J. J. S. nov. comb. — *Gaylussacia lanceolata* BL. Bijdr. (1826), 861; DUN. in DC. Prodr. VII, 2 (1840), 557; MIQ. Fl. Ind. Bat. II (1858), 1063. — *Vaccinium lanceolatum* J. J. S. in Ic. Bog. IV (1910), 68; in K. et V. Bijdr. 13 Booms. Java in Meded. Dep. Landb. No. 18 (1914), 144; KDS. Exkursionsfl. III (1912), 12. — *V. acuminatissimum* MIQ. Ann. Mus. Bot. Lugd. Bat. I (1863), 36. — *Agapetes lanceolata* NIED. in ENGL. Bot. Jahrb. XI (1890), 201. — *A. acuminatissima* NIED. l. c.

Java: Western part, Goenoeng Salak. (C. L. BLUME n. 2045!; S. H. KOORDERS n. 24469β!, 22 September 1896).

This species is well distinguished from *R. borneensis* especially by the marginal glands projecting in the way of small auricles, the longer and laxer inflorescences and the bracts, bracteoles and sepals not being prominently veined.

It appears to be confined to West-Java but in Sumatra several forms occur which are described below.

KOORDERS l. c. overlooked the fact that I adopted the name *Vaccinium*

lanceolatum for the species in Ic. Bog. IV, 68 and I did the same in Bijdr. 13 Booms. Java, 144.

f. **sumatrana.** — *Vaccinium acuminatissimum* MIQ. f. *β sumatrana* MIQ. Ann. Mus. Bot. Lugd. Bat. I (1863), 36. Fig. 2, a—f.

Frutex epiphyticus, ramulis tenuiusculis, superne flexuosis, teretibus, initio puberulis. Folia alterna, breviter petiolata, oblonga ad lanceolata, sensim longe acuminata, anguste obtusa, basi obtusa, sicco margine recurva, glandula marginali prominente excavata utrinque ad basin, adulta supra basi leviter puberula excepta glabra nitidaque, subtus puberula opaca, 7-plinervia, secundum nervos canaliculata, nervis adscendentibus, longissimis fere usque ad apicem productis, subtus prominentibus, ceterum nonnullis nervis parvis utrinque, reticulo venarum supra vix prominulo subtus obsoleto, rigida, c. 4.6—9.6 cm longa, 1.8—2.9 cm lata; petiolus semiteres, puberulus, 0.15—0.35 cm longus. Inflorescentiae axillares, solitariae, subsessiles, laxe satis multiflorae, racemosae, secundae, 3.25—4.5 cm longae, nonnullis squamis subulatis puberulis ad basin, rachide dense puberula. Bracteae patentes, incurvae, concavae, ellipticae ad rhombeae, acutae vel obtusae, medio vel infra medium latissimae, ibi utrinque glandula marginali sessili donatae, puberulae, ciliolatae, c. 0.4 cm longae, 0.2—0.25 cm latae. Flores c. 15, parvi, breviter pedicellati, pedicello curvulo, tereti, puberulo, pilis crassioribus muriciformibus insperso, cum ovario articulato, 0.2 cm longo, bracteolis 2 lineari-lanceolatis puberulis ciliolatis in margine nonnullis muricibus inspersis 0.14 cm longis ad basin. Calyx 5-partitus, laciniis patentibus, ovato-triangulis, leviter acuminatis, acutis, dorso puberulis, 0.18—0.2 cm longis, 0.125—0.14 cm latis. Corolla ample urceolata, canaliculis 5 longitudinalibus valde angulato-quinquelobata, apice contracto 5-lobulata, extus praesertim in angulis puberula, intus glabra, fere 0.3 cm longa, 0.275 cm, limbo 0.175 m diam., secta et explanata 0.325 cm longa, 0.475 cm lata, lobis recurvis, convexis, triangulis, obtusis, c. 0.05 cm longis, 0.06—0.07 cm latis. Stamina 10, 0.25 cm longa; filamentum leviter sigmoideum, lineare, sparse longiuscule pilosum; anthera dorsifixa, verticalis, oblonga, apicem versus angustata, subrecta, basi obtusissima 4-lobulata, circiter usque medium in tubulos 2 erectos contiguos rectos apicem versus leviter attenuatos obtusos poro introrso longo lineari hiantes fissa, thecis antice sulco separatis sulco laterali instructis, tubulis exceptis minute echinulata, calcaribus 2 supra basin angulato-incurvis ceterum rectis erectis parallelis lineari-subulatis obtusis medium tubulorum attingentibus vel paululum superantibus dorso ad basin tubulorum, 0.125 cm longa. Ovarium semiglobosum, dense puberulum, 0.1 cm altum, fere 0.2 cm diam.; stylus teres, truncatus, basi attenuatus, glaber, 0.3 cm longus. Discus annulari-crateriformis, extus 10-lobulatus, c. 0.1 cm diam.

Sumatra: West coast, Goenoeng Tandike and Singgalang. (P. W. KORTHALS!). Padang, Ajer Mantjoer, 360 m. (O. BECCARI n. 516!, August 1878). Bengkoeloe, Soeban Ajam. (Expedition E. JACOBSON, AJOEB n. 353!, 12 July 1916; „epiphytical, flowers white").

Differing from the type in the smaller leaves with more sunk nerves, commonly shorter inflorescences, somewhat larger flowers.

Description from herbarium.

f. **marapiensis**. Fig. 3, a—g.

Frutex, ramulis elongatis, dense pubescentibus. Folia alterna, breviter petiolata, lanceolata, sensim longissime acuminata, apice obtusa vel obtusiuscula, basi breviter in petiolum contracta, in utraque parte canaliculae longitudinalis convexa, interdum etiam secundum nervos basilares superiores leviter canaliculata, margine sicco recurva, glandula marginali prominente excavata utrinque ad basin, novella utrinque puberula, supra glabrescentia, 5-plinervia, nervis intra marginem anastomosantibus, pare secundo longe adscendente, costa media subtus prominente, reticulo venarum supra plerumque distincte prominente subtus obsoleto, tenuiter coriacea, rigida, c. 4.25—8.5 cm longa, 1.1—2 cm lata; petiolus a dorso compressus, transverse rugulosus, puberulus, 0.25—0.3 cm longus. Inflorescentiae axillares, solitariae vel interdum fasciculatae, subsessiles, racemosae, laxe multiflorae, secundae, c. 4—6 cm longae, squamis subulatis puberulis ad c. 0.45 cm longis ad basin, rachide dense puberula. Bracteae patentes, incurvae, valde concavae, lanceolatae, versus apicem angustatae, obtusiusculae, ciliolatae, c. 0.4 cm longae, bene 0.1 cm latae. Flores parvi, breviter pedicellati, pedicello curvulo, tereti, puberulo, c. 0.075 cm longo, bracteolis 2 ovato-lanceolatis longe angustatis puberulis ciliatis 1-nerviis c. 0.18—0.2 cm longis, 0.04 cm latis ad basin. Calyx 5-partitus, c. 0.25 cm diam., laciniis corollae adpressis, ovato-triangulis, acuminatis, acutis, dorso sparse puberulis, ciliolatis, 0.125 cm longis, 0.08—0.1 cm latis. Corolla ovoideo-urceolata, canaliculis 5 longitudinalibus valde angulato-quinquelobata, apice 5-lobulata, puberula, macerata secta et explanata 0.35—0.36 cm longa, 0.45 cm lata, lobis recurvis convexis triangulis obtusis 0.05—0.06 cm longis, 0.06—fere 0.1 cm latis. Stamina 10, 0.175—0.2 cm longa; filamentum leviter sigmoideum, lineare, sparse longe pilosum; anthera dorsifixa, verticalis, recta, oblonga, apicem versus sensim angustata, basi obtusissima 4-lobulata, usque ad vel paululum ultra medium in tubulos 2 contiguos apicem versus attenuatos poro parvo introrso longitudinali hiantes fissa, thecis antice sulco separatis, tubulis exceptis minute echinulata, calcaribus 2 brevibus divergentibus anguste triangulis obtusis supra basin tubulorum, fere 0.1 cm longa. Ovarium semiglobosum, dense puberulum, cum pedicello articulatum, 0.05 cm altum, 0.13 cm diam.; stylus teres, glaber. Discus pulvinatus, medio excavatus, margine lobulatus, puberulus? Fructus subglobosus, puberulus, maceratus 0.36 cm diam.

Sumatra: West coast, Goenoeng Marapi, 1100 m, on a tree in forest. (H. A. B. BÜNNEMEIJER n. 4868!, 23 September 1918). Same locality, 1200 m, border of forest. (H. A. B. BÜNNEMEIJER n. 5010 (type!), 30 September 1918; „flowers white'').

Differing from the type in the small, more leathery leaves with especially the midrib sunk.

Description from herbarium.

f. elliptica. Fig. 4, a—k.

Frutex, ramulis saepe plus minusve flexuosis, teretibus, verrucosis, novellis puberulis, glabrescentibus. Folia alterna, brevissime petiolata, oblique elliptica, satis abrupte anguste acutiuscule acuminata, basi angustata obtusa vel obtusiuscula, margine leviter recurvula, glandula marginali sessili lobuliformi obtusa utrinque ad basin, supra subtusque praesertim in nervis minute puberula, glabrescentia, 5—7-plinervia, nervis basalibus adscendentibus intra marginem anastomosantibus tenuibus supra in canaliculis prominentibus subtus prominentibus superioribus fere usque ad apicem productis, ceterum nonnullis nervis lateralibus parvis plerumque supra in canaliculis prominulis utrinque, reticulo venarum satis distincto utrinque vix prominulo, sicco coriacea, sordide fusca, utrinque nitidula, c. 7—13 cm longa, 2.5—4.7 cm lata; petiolus brevissimus, hirtellus, plus minusve glabrescens, rugulosus, 0.2—0.3 cm longus. Inflorescentiae axillares, solitariae vel geminatae, brevissime pedunculatae, plus minusve secundae, laxe pluriflorae, c. 3 cm longae, squamis subulatis puberulis ad basin, rachide tenui, dense fuscescente puberula. Bracteae patentissimae, incurvae, concavae, subovatae vel subrhombeae, subulato-acuminatae, interdum utrinque glandula marginali instructae, dorso puberulae, ciliolatae et nonnullis muricibus minutis in margine inspersae, c. 0.375 cm longae, bene 0.15 cm latae. Flores breviter pedicellati, cum ovario 0.48 cm longae, pedicello cum ovario articulato, tereti, puberulo, c. 0.2 cm longo, bracteolis 2 angustis lineari-subulatis apice incurvis concavis puberulis ciliolatis et in margine minute muriculatis c. 0.225 cm longis, 0.05 cm latis ad basin. Calyx patens, 5-partitus, 0.325 cm diam., laciniis triangulis, acuminato-angustatis, acutis vel obtusiusculis, dorso patentissime hirtellis, ciliatis et nonnulis muricibus parvis in margine, 0.175—fere 0.2 cm longis, 0.08—0.14 cm latis. Corolla ovoideo-urceolata, sulcis 5 longitudinalibus sectione transversa 5-lobata, apice contracto 5-lobulata, basi contracta, patentissime puberula, macerata et subcompressa 0.375 cm longa, 0.275 cm diam., secta et explanata 0.375 cm longa, bene 0.6 cm lata, lobis triangulis, acutis vel acutiusculis convexis, 0.075 cm longis, 0.075—0.1 cm latis. Stamina 10, c. 0.25 cm longa; filamentum lineare, leviter sigmoideum, omnino patentissime longiuscule pilosum, 0.15 cm longum; anthera dorsifixa, ambitu oblongo-triangula, basi obtusissima quadrilobulata, in tubulos 2 erectos contiguos thecis longiores apicem versus attenuatos apice antice viso anguste obtusos a latere viso acutos poro elongato introrso hiantes producta, inter thecas et tubulos plerumque leviter constricta, thecis antice sulco separatis sulco laterali instructis, calcaribus 2 brevibus reversis incurvulis obtusis dorso ad basin tubulorum, tubulis exceptis minute echinulata, 0.125—0.14 cm longa. Ovarium semiglobulosum, dense hirtellum et pilis paulo crassioribus inspersum, 0.1 cm altum, fere 0.2 cm diam.; stylus teres, truncatus, glaber, fere 0.3 cm longus. Discus disciformis, vix lobulatus, vertice truncatus, breviter erecto-hirtellus, c. 0.1 cm diam. Fructus calyce erecto discoque coronatus, globosus, dense hirtellus, 0.4 cm diam., 10-loculare, septis tenuibus. Semina c. 11, oblonga, recta, 0.22—0.25 cm longa.

Simaloer: (ACHMAD n. 529 (type!), 8 July 1918; nom. ind. „lingkih$_2$ datan”).

Mentawai Islands: Sipora, environs of Sioban, epiphytical in forest. (IBOET n. 538!, 29 October 1924; „flowers white”).

This appears to be defined to the islands on the west coast of Sumatra. The leaves are distinctly elliptic.

Description from herbarium.

Rigiolepis Korthalsii J. J. S. n. sp. — *Vaccinium acuminatissimum* MIQ. f. *borneensis* MIQ. Ann. Mus. Bot. Lugd. Bat. I (1863—’64), 36. Fig. 5, a—f.

Frutex, ramulis teretibus, pubescentibus, lenticellis verruciformibus. Folia alterna, breviter petiolata, ovata vel lato-ovata ad lanceolato-ovata, longissime caudato-acuminata, acuta vel anguste obtusa, basi rotundata, integerrima, margine sicco recurva, glandula marginali impressa utrinque supra basin, supra glabra basi in costa media tantum pubescentia, subtus sparse punctata initio strigillosa et in costa parce patenter puberula, margine parce ciliata, 7—9-plinervia, nervis basilaribus curvatis intra marginem anastomosantibus supra in sulcis prominulis subtus bene prominentibus superioribus longe adscendentibus, reticulato-venosa, venis utrinque prominulis, inter nervos bullata, coriacea, 4—11 cm longa, 1.7—4.2—6 cm lata; petiolus pubescens, 0.1—0.5 cm longus. Inflorescentiae (in fructu) axillares, solitariae, racemosae, brevissime pedunculatae, laxe vel sublaxe pluri- ad satis multiflorae, 0.8—6 cm longae, pluribus squamis triangulis ad elongato-subulatis puberulis usque 0.7 cm longis ad basin, rachide pubescente. Bracteae subpersistentes, ovatae ad rhombeae, obtusae vel acutae, saepe supra basin vel medio utrinque glandula marginali crassiuscula impressa instructae, parcius pubescentes et ciliatae, 0.23—0.3 cm longae, 0.15—0.24 m latae. Baccae sepalis incurvis discoque coronatae, subglobosae, parce puberulae, 0.55 cm diam., 10-loculares, pariete carnoso, septis membranaceis, loculis 1—2-spermis; pedicellus puberulus, 0.3—0.65 cm longus, bracteolis 2 persistentibus, ovato-lanceolatis suboppositis vel remotis donatus. Semina compressa, elliptica, basi acuta, lateribus convexa, 0.225—0.25 cm longa.

Borneo: Wester-Afdeeling, summit of the Sakoembang (Sekoembang). (P. W. KORTHALS, type!)

This is neither a form of *Vaccinium acuminatissimum* MIQ. nor *R. borneensis* HOOK.F. but a distinct species well characterized by the shape of the leaves. BLUME named it *Munnickia lanceolata* BL. var. *latifolia* BL. in the Leiden Herbarium.

Description from herbarium.

Rigiolepis macrophylla J. J. S. n. sp.

Frutex validus, ramulis brevissime tomentello-puberulis. Folia alterna, magna, breviter petiolata, oblongo-ovata, longe acuminata, apice anguste obtusa, basi rotundata, margine sicco recurva, glandula marginali impressa utrinque prope basin, adulta magnam partem glabra, utrinque in nervis praesertim ad basin puberula, 5—7-plinervia, ceterum penninervia, nervis lateralibus in toto 7—8 utrinque, in costam valde decurvis, valde adscendentibus bene curvatis intra marginem anastomosantibus supra in canaliculis prominentibus subtus valde prominentibus, reticulato-venosa, venis supra in canaliculis inconspicuis leviter prominulis subtus tenuiter prominulis, coriacea, supra nitida, subtus plerumque opaca, 20—30 cm longa, 6.75—9 cm lata; petiolus subsemiteres, puberulus, 0.4—0.8 cm longus. Inflorescentiae (in fructu) axillares, fasciculatae, brevissime pedunculatae, satis multi-(c. 15-)florae, rachide sicco angulata, brunneo-puberula, 3.2—3.6 cm longae. Bracteae ovatae, incurvae, concavae ad cucullato-concavae. Baccae erecto-patentes, sepalis incurvis coronatae, puberulae, pedicello puberulo, 0.45—0.5 cm longo.

Central Borneo: Boekit Batoe Lesoeng. (Exp. A. W. NIEUWENHUIS 1898—'99, AMDJAH n. 480; type!)

Although this is only in fruit I have described it as it is very characteristic in its large foliage.

A plant collected by HALLIER (n. 1281) at Soengai Semitau may belong here but the marginal glands are placed exactly at the base of the blade and somewhat prominent.

Description from herbarium.

Rigiolepis sulcata J. J. S. nov. comb. — *Vaccinium sulcatum* RIDL. in Kew Bull. 1922, 107.

Borneo: Sarawak. (O. BECCARI n. 3780). Niah. (G. D. HAVILAND and C. HOSE n. 3466). Near Kuching. (G. D. HAVILAND n. 1625).

Rigiolepis bigibba J. J. S. comb. nov. — *Vaccinium bigibbum* J. J. S. in Bull. Jard. Bot. Buit. 3e sér. I (1918), 408, t. 55.

Borneo: Wester-Afdeeling, Landak, Poelau Pandjang. (J. E. TEYSMANN n. 7966!). Kapoeas. (J. E. TEYSMANN n. 7970!). Without locality and number. (JAHERI; type!). Soengai Semitau. (H. HALLIER n. 1281b!, 1893—'94). Soengai Bloe-oe. (Exp. A. W. NIEUWENHUIS 1896—'97, JAHERI n. 425!). ?Soengai Broenai. (Exp. A. W. NIEUWENHUIS 1896—'97, JAHERI n. 714!).

The marginal glands are in this species somewhat prominent but not so distinctly as in *R. lanceolata*.

It seems that the flower described and figured in Ic. Bog. l. c. was somewhat disturbed. In other flowers I found the anther tubes tapering and the spurs well developed and subulate.

Rigiolepis Moultonii J. J. S. nov. comb. — *Vaccinium Moultonii* MERR. in Journ. Mal. Br. R. As. Soc. LXXXVII (1923), 22.

Borneo: Sarawak, Upper Baram, Gunong Tembao (Temalok?), 1200 m. (J. C. MOULTON n. 6676 (type), 5 November 1920; colour of flowers Saccardo n. 26). Gat, Upper Rejang river. (J. and M. S. CLEMENS n. 21697!, 24 October 1929).

Very near *R. bigibba* J. J. S.

Rigiolepis salicifolia J. J. S. n. sp. Fig. 6, a—k.

Frutex epiphyticus, laxe ramosus, ramulis elongatis, tenuibus, saepe quaquaverse flexuosis, dense puberulis, indumento diu persistente, laxe foliatis. Folia alterna, brevissime petiolata, ovato-lanceolata ad anguste ovato-lanceolata, latiora sensim longe angusteque acuminata, angustiora sensim longissime angustato-acuminata, anguste obtusa vel acuta, basi foliorum latiorum obtusa foliorum angustiorum breviter cuneata subacuta, utrinque supra basin glandula marginali sessili instructa, adulta supra ad basin et in costa media leviter puberula glabrescentia, subtus nonnullis muricibus minutis adpressis inspersa, ut videtur glabrescentia,

5-plinervia, superne utrinque nervis lateralibus majoribus 2—3 instructa, nervis basilaribus lateralibusque erecto-patentibus, praesertim pare nervorum tertio vel quarto longissime adscendentibus, nervis majoribus supra in canalicula prominentibus subtus prominentibus, reticulo venarum supra prominente subtus plerumque minus distincto, sicco rigide coriacea sed satis tenuia, supra subnitidula sordide cinerea vel fuscescenti-cinerea, subtus magis fuscescentia, 4.8—10—9.5 cm longa, 0.8—1.6—2.35 cm lata; petiolus subteres, puberulus, glabrescens, c. 0.15—0.3 cm longus. Inflorescentiae axillares vel in axillis squamarum in ramulorum parte inferiore, solitariae vel binae, foliis breviores, brevissime pedunculatae, pluri- vel satis multiflorae, squamulis e basi dilatata subulatis ad basin et in pedunculo, rachide filiformi, puberula, 2.3—4.8 cm (fructificatione) longa. Bracteae parvae, patentes vel recurvae, incurvae, concavae, quadrangulae ad oblongae, conspicue acuminatae, ciliolatae et parce minute muriculatae, c. 0.14 cm longae. Flores c. 7—15, parvi, pedicello satis longo, tenui, puberulo et muricibus minutis clavatis insperso, c. 0.56 cm longo, bracteolis 2 plerumque remotis parvis angustis concavis puberulis in parte inferiore vel raro versus medium. Calyx 5-partitus, 0.275 cm diam., laciniis laxe adpressis, late subovato-triangulis, acutis vel leviter acuminatis, ciliolatis et minute muriculatis in margine, 0.075—0.08 cm longis, 0.1 cm latis. Corolla ovoideo-urceolata, longitudinaliter 5-plicato-lobata, apice bene contracto 5-lobata, parcissime muriculato-puberula, intus glabra, tenuis, macerata c. 0.4 cm longa, 0.3 cm diam. (compressa), secta et explanata c. 0.44 cm longa, 0.74 cm lata, lobis parvis, recurvis, convexis, triangulis, obtusis, 0.04 cm longis, 0.05—0.075 cm latis. Stamina 10, inclusa, 0.3 cm longa; filamentum lineare, versus basin paululum dilatatum, undato-sigmoideum, patentissime pilosum, 0.15 cm longum; anthera dorsifixa, introrsa, subrecta, ovalis, basi truncato-obtusa, minute echinulata, thecis antice sulco separatis sulco laterali instructis, in tubulos 2 conspicuos erectos rectos contiguos apicem versus angustatos anguste obtusos poro elongato introrso hiantes producta, calcaribus 2 conspicuis dorso ad basin tubulorum reversis falcato-adscendentibus vix divergentibus subulatis obtusiusculis minutissime echinulatis fere 0.05 cm longis, c. 0.2 cm longa, tubulis dimidium totius longitudinis paulum superantibus. Ovarium cum pedicello articulatum, turbinatum, puberulum muriculatumque, 0.07 cm altum, 0.125 cm diam.; stylus teres, glaber, 0.3 cm longus. Discus pulvinatus, radiato-10-lobulatus, pubescens, bene 0.1 cm diam. Fructus calyce discoque coronatus, globosus, praesertim basi puberulus muriculatusque, 0.45 cm diam., 10-locularis, c. 25-spermus, septis omnibus tenuibus, pedicello c. 0.9 cm longo. Semina 2—3 in loculis, oblonga ad triangula, 0.24—0.275 cm longa.

Central East Borneo: West Koetai, Kemoel, 1800 m, epiphytical in primeval forest. (F. H. ENDERT n. 4100!, 13 October 1925; „epiphytical, calyx green, corolla dirty dark red"). Summit of the Kemoel, 1800 m, mountain-ridge, primeval forest, humus. (F. H. ENDERT n. 3988!, 13 October 1925; „fruit first yellow, afterwards orange-red"). Kong Kemoel, 1800 m, on tree in primeval forest. (F. H. ENDERT n. 4425 (type!), 20 October 1925; „shrub, flowers first yellow, afterwards red, fruit yellow").

In the shape of the flowers resembling in many respects *R. filiformis* J. J. S. but differing in the narrow leaves with partly long ascending basal nerves, larger, shorter pedicelled flowers with relatively shorter anther-tubes.

Description from herbarium.

Rigiolepis leptantha J. J. S. nov. comb. — *Vaccinium leptanthum* MIQ. Ann. Mus. Bot. Lugd. Bat. I (1863—'64), 37; J. J. S. in K. et V. Bijdr. Booms. Java, XIII (1914), 146, in Meded. Dep. Landb. No. 18. — *V. acuminatissimum* MIQ. f. *leptantha* VUYCK ex BOERL. Handl. II (1891), 263. — *Agapetes leptantha* NIED. in ENGL. Bot. Jahrb. XI (1890), 201.

Sumatra. (P. W. KORTHALS n. 468b!, n. 1251!). Karangnata. (H. O. FORBES n. 3129!, 1880).

Lingga Archipelago: Poelau Semarang, 10 m. (H. A. B. BÜNNEMEIJER n. 7517!, 17 August 1919).

Java: Goenoeng Papandajan. (P. W. KORTHALS!).

This species is well characterized by the abruptly acuminate, triplinerved leaves with the basal nerves very thin, rather obscure and long ascending, and the veins obsolete. The basal portion of the anthers is in comparison with the tubes very short.

f. elliptica.

Folia elliptica, longe satis abrupte obtuse acuminata, basi acuta vel late acuta, glandula marginali impressa utrinque paulo supra basin, 5-plinervia, nervis basilaribus supra tenuiter prominulis subtus vix conspicuis, costa media supra in canalicula prominula subtus leviter prominente, novella ut videtur utrinque minutissime puberula, plus minusve glabrescentia, subtus leviter punctata, sicco supra nitidissima, sordide grisea vel griseo-fusca, subtus opaca sordide fusca, 4.5—7.5 cm longa, 1.6—2.6 cm lata; petiolus semiteres, costa media in facie superiore pedicelli decurrente, tomentellus, 0.3—0.5 cm longus. Inflorescentiae (in fructu) axillares, solitariae, breves, minute puberulae.

Borneo: Sarawak, Kinabalu, Bidi cave. (J. and M. S. CLEMENS n. 20689!, 19 October 1929). Wester-Afdeeling, Goenoeng Semedoem. (H. HALLIER n. 711!, 1893—'94).

This differs from the type in the broader, less abruptly acuminate leaves.

HALLIER noted on the label: „Blätter erst durch's Trocknen lackiert").

HAVILAND and HOSE n. 984 looks very much the same like *R. leptantha*; it may be a variety or a closely allied species.

Rigiolepis Endertii J. J. S. n. sp. Fig. 7, a—f.

Frutex, ramulis tenuiter puberulis. Folia alterna, breviter petiolata, ovato-lanceolata, longissime acuminata, anguste obtusa vel saepe acuta, basi rotundata et breviter vel distinctius cuneato-angustata, integerrima, margine sicco recurvula, glandula marginali impressa utrinque supra basin, adulta supra glabrata vel basi in nervis leviter puberula, subtus magis puberula et muricibus minimis adpressis inspersa, 5—7-plinervia, ceterum nervis lateralibus 3—4 utrinque, nervis lateralibus tenuibus patentibus longe adscendentibus intra marginem anastomosantibus utrinque prominentibus sed nervis supra saepe in canaliculis sitis, reticulo venarum supra subtusque plus minusve prominulo, coriacea, supra nitida, subtus nitidula, c. 8.5—16 cm longa, 2—3.9 cm lata; petiolus supra costa a costa media decurrente instructus, transverse rugulosus, tenuiter puberulus, 0.3—0.5 cm longus. Inflorescentiae axillares vel potius paulo supra-axillares, solitariae vel fasciculatae, laxe racemosae, fere sessiles, pluri-multiflorae, nonnullis squamis subulatis puberulis ad basin, pedunculo abbreviato, nonnullis squamis breviter ovatis concavis puberulis in bracteas vergentibus donato, rachide tenui, sicco angulata, puberula, c. 2.4—4.7 cm longa. Bracteae patentissimae, oblongae, acutae vel apiculatae, concavae, ciliolatae, c. 0.24—0.27 cm longae, 0.08 ad fere 0.1 cm latae. Flores c. 10—18, parvi, pedicellati, pedicello cum ovario articulato, brevi, crassiusculo, puberulo, c. 0.15—0.4 cm (sub fructu) longo, bracteolis 2 subadpressis lanceolato-triangulis ad subulatis acutis puberulis 0.08—0.1 cm longis donato. Calyx 5-partitus, corollae adpressus, bene 0.1 cm altus, 0.23 cm diam., laciniis triangulis, acutis, parcissime muriculatis, ciliolatis, fere 0.1 cm longis, c. 0.1 cm latis. Corolla subgloboso-urceolata, plicis 5 longitudinalibus 5-angulato-lobata, apice constricta, 5-lobata, extus parcissime minute muriculata, intus glabra, macerata c. 0.4 cm longa, 0.3 cm diam., secta et explanata 0.4 cm longa, 0.74 cm lata, lobis brevibus, recurvis, convexis, e basi lata contractis, obtusis, c. 0.06 cm longis, 0.1—0.14 cm latis. Stamina 10, 0.3 cm longa; filamentum valde undato-sigmoideum, lineare, densius satis grosse patentissime pubescens, 0.2 cm longum; anthera dorsifixa, tota oblonga, absque tubulis subquadrata, basi truncato-obtusissima 2—subquadrilobulata, in tubulos 2 incurvos cum parte inferiore angulum obtusum vel fere rectum facientes rectos contiguos apicem versus attenuatos obtusos poro longitudinali introrso hiantes parte inferiore subaequilongis producta, thecis antice sulco separatis sulco laterali instructis, calcaribus 2 reversis parallelis rectis linearibus obtusis 0.03 cm longis ad basin tubulorum, tubulis exceptis minute echinulata, tota 0.14 cm longa. Ovarium semiglobosum, minute muriculatum, 0.1 cm altum, 0.2 cm diam., 10-loculare, septis omnibus tenuibus; stylus teres, glaber, apice truncatus, 0.35 cm longus. Discus pulvinatus cum excavatione, margine inconspicue 10-lobulatus, glaber, 0.14 cm diam.

Central East Borneo: Koetai, Kemoel, 1500 m, on a narrow rocky mountain-ridge. (F. H. ENDERT n. 3883 (type!), 12 October 1925; „shrub, 4 m high, fruit yellow to orange"). Same locality, 1800 m, on a tree in primeval forest. (F. H. ENDERT n. 4479!, 22 October 1925; „shrub, fruit-galls").

This has in common with *R. filiformis* J. J. S. (ENDERT n. 4041) the nearly penninerved leaves but is readily distinguished by the stronger nerved, more shining leaves, the much stouter inflorescences, larger, shorter pedicelled flowers, relatively shorter anthertubes and straight spurs.

There are two kinds of anthers on the material. Those described above are probably the normal ones. The others are smaller, measuring only 0.2—0.25 cm, the anther 0.07—0.075 cm. The filaments are shorter and much less bent; the tubes and the spurs of the anther are also shorter, the tips of the former recurved. Both forms may occur in the same flower.

N. 4479 bears only fruit-galls but belongs, I think, to the same species.

Description from herbarium.

Rigiolepis caudatifolia J. J. S. nov. comb. — *Vaccinium flagellatifolium* MERR. in herb. — *V. caudatifolium* MERR. in Journ. Str. Br. R. As. Soc. 76 (1917), 103 (non HAYATA in Ic. Pl. Formosa, 3 (1913), 127, t. 22); H. COPEL in Phil. Journ. Sc. 42 (1930), 567.

Borneo: Sarawak, without definite locality. (Nat. coll. n. 1679, type!). Liu-Matu, Baram. (N. 2792 Bur. Sc., Nov. 1, 1914; J. C. MOULTON n. 43!, 2 Nov. 1914, in fruit).

Rigiolepis filiformis J. J. S. n. sp. Fig. 8, a—e.

Frutex epiphyticus, ramis elongatis, ramulis sicco angulatis, minute

puberulis. Folia alterna, brevissime petiolata, lanceolata, versus apicem angustata, longe acuminata, acuta vel anguste obtusiuscula, basi cuneata, integerrima, margine revoluta, basi utrinque glandula marginali sessili instructa, novella utrinque minutissime puberula, adulta glabrescentia, subquintuplinervia, nervis basilaribus infimis minutis, ceterum in utraque parte costae mediae sicco supra in canalicula prominentis subtus prominentis nervis lateralibus c. 6—4 patentibus ad erecto-patentibus adscendentibus intra marginem anastomosantibus satis irregularibus tenuibus cum reticulo venarum supra subtusque prominulis, coriacea, opaca, c. 9.5—15.5 cm longa, 2.5—4 cm lata; petiolus saepe valde curvatus, subsemiteres, supra versus apicem costa media convexo-prominente, transverse rugulosus, initio minutissime puberulus, c. 0.2—0.4 cm longus. Inflorescentiae axillares et etiam e nodis ramulorum defoliatorum, solitariae ad fasciculatae, subsessiles vel breviter pedunculatae, laxe satis multiflorae, 3—5 cm longae, pedunculo usque ad c. 1 cm longo, nonnullis squamis subulatis puberulis donato, rachide filiformi, minute puberula. Bracteae persistentes, patentissimae, subnaviculari-concavae, oblongae, obtusae, ciliolatae, 0.15 cm longae, infimae e basi lata subulato- vel triangulo-acuminatae. Flores ad c. 14, parvi, cum ovario c. 0.26 cm longi, manifeste pedicellati, pedicello filiformi, sparse brevissime puberulo, c. 0.6—0.8 cm longo, bracteolis 2 parvis oppositis vel remotis adpressis anguste triangulis acutis vel subulatis concavis ciliolatis paulum vel bene supra medium pedicelli sitis. Calyx 5-partitus, corollae adpressus, 0.15 cm diam., 0.06 cm altus, laciniis triangulis, acutis vel acutiusculis, ciliolatis, 0.06—0.07 cm longis, 0.04—fere 0.05 cm latis. Corolla ovali-urceolata, fauce constricta, 5-loba, tubo sectione transversa plicato-quinquelobata, sparse brevissime puberula, 0.175 cm, limbo 0.15 cm diam., secta et explanata transverse oblongo-quadrangula, c. 0.26 cm longa, 0.45 cm lata, lobis recurvis, convexis, triangulis, obtusis, 0.05 cm longis, 0.075 cm latis. Stamina 10, c. 0.225 cm longa; filamentum undatum, lineare, ima basi excepta pilosum, 0.12—0.125 cm longum; anthera in fere $^1/_3$ supra basin totius longitudinis dorsifixa, subovalis, thecis antice sulco separatis sulco laterali instructis, basi subaequaliter 4-lobulata, echinulata, in tubulos 2 elongatos erectos contiguos rectos lineares obtusos poro introrso longissimo hiantes producta, calcaribus 2 brevibus adscendentibus subulatis obtusis dorso ad basin tubulorum, tota 0.15 cm longa, tubulis 0.1 cm longis, calcaribus fere 0.025 cm longis. Ovarium cum pedicello articulatum, bene subsemiglobosum, 0.04 cm altum, 0.07 cm diam.; stylus tenuis, teres, glaber, stigmate truncato, 0.18 cm longus. Discus satus alte pulvinatus, sulcis 10 longitudinalibus 10-costato-lobulatus,

vertice satis profunde excavatus et parce pilosus, 0.06 cm diam.

Central East Borneo: West Koetai, Bolset, 400 m, epiphytical in primeval forest along riverbank. (F. H. ENDERT n. 4041 (type!), 5 September 1925; „hanging downward, 4 m long, flowers light yellow, anthers brown").

This species resembles *R. leptantha* J. J. S. but the leaves are larger, more gradually acuminate, penninerved with the basal nerves not conspicuous and the larger sidenerves more prominent, not shining, and the inflorescences still thinner. From *R. salicifolia* J. J. S. it differs in the larger, almost penninerved leaves.

Description from herbarium and flowers preserved in spirit.

THE GENUS NYSSA IN THE NETHERLANDS INDIES

by

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(B) = the Herbarium of the Botanic Garden, Buitenzorg.
(BD) = the Herbarium of the Botanic Garden, Berlin—Dahlem.
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(U) = the Herbarium of the University, Utrecht.

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Nyssa

LINN., Sp. pl., ed. 1, 2, p. 1058 (1753); Gen. pl., ed. 5, p. 478 (1754); BENTH. & HOOK.F., Gen. pl., 1, p. 952 (1867); CLARKE, in HOOK.F., Fl. Br. Ind., 2, p. 747 (1879); BOERL., Handl. Fl. Ned. Ind., I, 2, p. 655 (1890); HARMS, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 257 (1898); KOORD. & VAL., Bijdr. booms. Java, 5, p. 95 (1900); GAMBLE, Man. Ind. timb., ed. 2, p. 392 (1902); KING, Journ. As. Soc. Beng., 71, II, p. 79 (1902); WANGERIN, in Engl. Bot. Jahrb., 38, Beibl. 86, p. 69—75, 85—86 (1906); in ENGL., Pflanzenr., IV, 220a, p. 8 (1910); KOORD., Exkursionsfl. Java, 2, p. 730 (1912); RIDL., Fl. Mal. Pen., 1, p. 895 (1922); KOORD., Fl. Tjib., 2, p. 234 (1923); EVRARD, in LEC., Fl. Indo-Ch., 2, p. 1195 (1923); *Agathisanthes* & *Ceratostachys* BLUME, Bijdr., 13, p. 645, 644 (1825); D. C., Prodr., 3, p. 10, 23 (1828); G. DON, Gen. hist. dichl. pl., 2, p. 657, 667 (1832); ENDL., Gen. pl., p. 1183 (1840); MIQ., Fl. Ind. Bat., I, 1, p. 838, 839 (1856); *Agathidanthes* HASSK., Cat. pl. Hort. Bot. Bogor., p. 254 (1844); *Daphniphyllopsis* KURZ, in Journ. As. Soc. Beng., 44, II, p. 201 (1875); For. Fl. Burma, 1, p. 240 (1877).

Only species:

Nyssa javanica (BLUME) WANGERIN — *Ceratostachys arborea* BLUME, Bijdr., 13, p. 644 (1825); D. C., Prodr., 3, p. 23 (1828); G. DON, Gen. hist. dichl. pl., 2, p. 667 (1832); MIQ., Fl. Ind. Bat., I, 1, p. 839 (1856); TEYSM. & BINNEND., Cat. pl. Hort. Bot. Bogor., p. 238 (1866); *Agathisanthes javanica* BLUME, Bijdr., 13, p. 645 (1825); D. C., Prodr., 3, p. 10 (1828); G. DON, Gen. hist. dichl. pl., 2, p. 657 (1832); HASSK., Aant. nut, p. 50 (1845); MIQ., Fl. Ind. Bat., I, 1, p. 839 (1856); TEYSM. & BINNEND., Cat. pl. Hort. Bot. Bogor., p. 238 (1866); *Agathidanthes javanica* HASSK., Cat. pl. Hort. Bot. Bogor., p. 254 (1844); *Nyssa sessiliflora* HOOK.F. & THOMS., in BENTH. & HOOK.F., Gen. pl., 1, p. 952 (1867); CLARKE, in HOOK.F., Fl. Br. Ind., 2, p. 747 (1879); BOERL., Handl. fl. Ned. Ind., I, 2, p. 656 (1890); KOORD., in Teysmannia, 5, p. 63 (1894); HARMS, in ENGL. & PR., Nat. Pflanzenfam., III, 8, p. 258 (1898); KOORD. & VAL., Bijdr. booms. Java, 5, p. 96 (1900); GAMBLE, Man. Ind. timb., ed., 2, p. 392, t. 8, ic. 6 (1902); KING, in Journ. As. Soc. Beng., 81, II, p. 79 (1902); VAN EEDEN, Houts. Ned. Ind., ed. 3, p. 152 (1906); BRANDIS, Ind. trees, p. 357, ic. 149 (1906); WANGERIN, in Engl. Bot. Jahrb., 38, Beibl. 86, p. 69—75, 85—86 (1906); DE CLERQ, Plantk. woordenb., p. 291 (1909); BOLDINGH, Cat. pl. Herb. Hort. Bogor., p. 145 (1914); RIDLEY, Fl. Mal. Pen., 1, p. 895 (1922); *Ilex daphnephylloides* KURZ, in Journ. As. Soc. Beng., 39, II, p. 72 (1870); *Daphniphyllopsis capitata* KURZ, in Journ. As. Soc. Beng., 44, II, p. 201, t. 15 (1875); For. Fl. Burma, 1, p. 240 (1877); *Nyssa javanica* WANGERIN, in ENGL., Pflanzenr., IV, 220a, p. 15, ic. 2 (1909); KOORD.-SCHUM., Syst. Verz., 1, fam. 229, p. 100 (1912); KOORD. & VALET., Atlas 1, t. 192 (1913); KOORD., in Engl. bot. Jahrb., 50, suppl., p. 302 (1914); HEYNE, Nutt. pl. Ned. Ind., ed. 1, 3, p. 402 (1917); KOORD., Fl. Tjibod., 2, p. 235 (1923); EVRARD, in LEC., Fl. Indo-Ch., 2, p. 1196 (1923); E. G. BAKER, in Journ. Bot., 62, suppl., p. 45 (1924); DEN BERGER, in Meded. Proefst. Boschw., 13, p. 148, ic. 109 (1926); HEYNE, Nutt. pl. Ned. Ind., ed. 2, 2, p. 1216 (1927); CRAIB, Fl. siam. enum., 1, p. 809 (1931); *Nyssa arborea* KOORD., Exkursionsfl. Java, 2, p. 731 (1912); *Nyssa bifida* CRAIB, in Kew Bull., 1913, p. 69 (1913); Fl. siam. enum., 1, p. 809 (1931); *Nyssa sessiflora* JANSSON., in MOLL & JANSSON., Mikrogr., 3, p. 730, ic. 223 (1918).

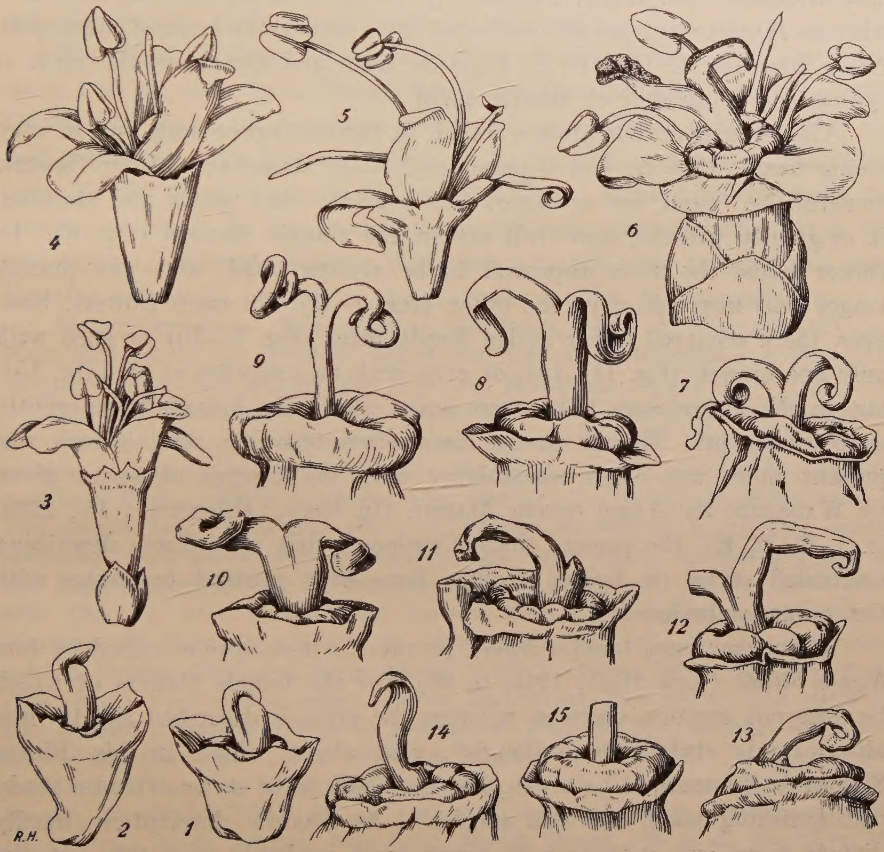
Dioecious. Young *twigs* terete, 2.5—4 mm thick, tomentose in the youth, less tomentose to glabrous later. *Leaves* spread (in seedlings the first pair of leaves opposite), rather densely placed, without stipules; petioles 1—3.5 cm long, 1.5—2 mm thick, flat or slightly grooved above, rounded beneath, densely appressedly hairy to glabrous; lamina oblong-lanceolate to obovate, rarely somewhat ovate, 5—23 cm long, 2.5—8 cm broad, acute at the base, abruptly acuminate towards the apex, entire (the apical portion remote-dentate in seedlings), thinly to rather thickly coriaceous, penninervous with 8—11 pairs of lateral nerves that are straight in the basal portion, incurved and uniting at some distance from the margin, distinct above, prominent below, sparingly appressedly hairy to tomentose on the midrib and the thicker lateral nerves beneath, glabrous for the rest. *Inflorescences* pedunculate nearly globose heads in the axils of the leaves, 12—18 mm in diameter; peduncles flattened towards the apex, 0.7—5 cm long, 1—1.5 mm thick, 2—5 mm broad at the apex, densely appressedly hairy to glabrous, nearly half-way with 1—2 small opposite, sessile, acute, 3—4 mm long, 1 mm broad bracts; receptacle globose to ellipsoidal, flattened, 2—3 mm long, 3 mm thick, 4—5 mm broad, rarely with 2—4 flowers remote from the head; male inflorescence with peduncle 1.5—3 cm long and with 20—40 flowers, female inflorescence with peduncle 0.7—5 cm long and usually 3—8, rarely up to 18 flowers. Flowers subtended by one bract and 2 bracteoles together enclosing the flower-base, all of them broadly ovate 2—2.5 mm long, the bract 1.5—3 mm broad, the bracteoles 1.5—2.5 mm broad, up to half-way connate, all ciliate and densely appressedly sericeous on both sides; bract of the male flower 2—2.5 mm long, 1.5—2.5 mm broad, that of the female flower somewhat larger, up to 2.5 mm long and 3 mm broad; bracteoles of the female flower up to 3 mm long, 2.5 mm broad, spreading, separated and somewhat larger when fruit-bearing; *male flower* pedicellate, the pedicel nearly cylindrical, slightly obconical, 0.5—4 mm long, 0.5—2.5 mm broad at the apex, densely appressedly hairy; calyx with 4—5 rounded teeth that are 1—1.5 mm broad, 0.5—0.75 mm long, appressedly hairy outside, ciliate; petals 4—5 in number, alternating with the calyx teeth, imbricate, ovate with broad base, curled back, 3—5 mm long, 1.5—3 mm broad, with very short spreading hairs on both sides; stamens 8—10 in number, in 2 alternating whorls, those of the outer whorl longer, 3—5 mm long, slightly dilate at the base, those of the inner whorl 2—4 mm long; anthers nearly elliptical, 1.5 mm long, 1 mm broad, dorsifixed, opening laterally with slits, the outer loculi often larger than the inner ones; disc 1—2 mm in diameter, 0.5—1 mm high, 8—10-lobed at the margin; *female flower* sessile; calyx campanulate, 2—3 mm long, circ. 1.5 mm broad, densely appressedly sericeous, with 4—5 short irregular rounded lobes 0.5—1 mm long 2.5 mm broad, sometimes nearly entire, ciliate; petals 4—5 in number, like those of the male flower, but smaller, 3—4 mm long, 2.5—3 mm broad; stamens 8—10 in number, in 2 alternating whorls, probably sterile, those of the outer whorl with filament 2—2.5 mm long and anther 1 mm long 0.75 mm broad, those of the inner whorl with filament 1—2 mm long and anther little developed or none; disc 2 mm in diameter, 0.5 mm high, slightly lobed at the margin, impressed in the middle; style 1, 1.5—2 mm long, 0.5—1 mm thick, with 2 divaricate or curled branches 1—2 mm long and stigmatose at the inside; ovary adnate to the calyx tube, one-celled; ovule one, anatropous, flattened, hanging, inserted near the top of the ovary. *Fruit* drupaceous, ellipsoidal, slightly flattened, 15—23 mm long, 10—15 mm broad, 7—14 mm thick, crowned by the calyx limb and the disc up to 2 mm in diameter and 1 mm high; exocarpium coriaceous, with few lenticels, glabrescent; mesocarpium spongious-fleshy; stone flattened-obovate, acute, 10—20 mm long, 5—12 mm broad, 2—6 mm thick, very hard, on one side with few tubercules above the middle and an indistinct longitudinal keel, on the other side with 5 longitudinal shallow grooves; seed with membranous spermoderm, smooth endosperm, large flat ovate-cordate cotyledons circ. 7 mm long 5 mm broad, penninervous with slightly palminervous base and a 2.5—3 mm long straight cylindrical rootlet. (Description after all the materials examined from the Malay Peninsula, Sumatra, Borneo and Java.)

According to notes on herbarium labels *Nyssa javanica* is a tall tree often up to 30 m, sometimes even up to 40 m high, with a regular bole occupying about half the total length and with a diameter of 1—2 % of the height in the lower portion, rarely up to 1 m in diameter. Once, in a specimen from Palembang (GRASHOFF 359) buttresses are mentioned. The flowers are called greenish or whitish or yellowish, and the odour is once called agreeable, once disagreeable. The fruit is once called yellow, once wine-red, once purple-red.

The species is distributed on the Asiatic Continent from the Central and Eastern Himalayas in south-eastern direction to Annam and the Malay Peninsula, and moreover in Sumatra, Java and Borneo. In the area dealt with it has been collected at altitudes of usually 600—1540 m, but once it is recorded from only 100 m elevation. CRAIB mentions one specimen from Siam from 100 m altitude, whereas it appears to occur in the Himalayas at much higher elevations (up to 2400 m according to HOOKER F.).

The polymorphy of the materials extant of *Nyssa javanica* suggests that perhaps there might exist more than one species in the area, as was already considered by KOORDERS and VALETON (Bijdr. booms., 5, p. 98, 101) on account of the variability of the fruit. It is therefore that the present author especially has paid attention to the characters of the flowers, about which there are found many descrepancies in literature.

Blume mentions for *Agathisanthes* that the *male* flowers have no petals. The present author, however, always found 4 or 5 petals in them (fig. 3—5).



Nyssa javanica. Fig. 1—2, female flower-buds, the petals and stamens taken away (Koorders 15359β); 3—5, male flowers (Endert 3179, Boschpr. S. W. K. III. 20 and bb. 6708); 6, female flower (cult. in Hort. Bog. sub VII. F. 1); 7—10, female flowers, without petals and stamens, the styles and stigma intact (Wray 1617, Boschpr.bb. 1969, Hansen 159, Uhl 5811a); 11—14, idem, with one style branch broken off (Koorders 27701β, Wray 422, Blume s.n. from Poelasari, Koorders 1315β); 15, idem, both style branches broken off (Boschpr.bb. 1969). All figures 10 ×.

According to Bentham & Hooker f., Clarke, King and Boerlage, there are, in the *female* flower, no petals at all or only small ones;

according to BLUME, MIQUEL and RIDLEY, there are no petals at all. After BENTHAM & HOOKER F., CLARKE, KING and BOERLAGE stamens are entirely lacking; by BLUME, MIQUEL, RIDLEY and EVRARD stamens are not mentioned. According to KURZ (J. As. Soc. Beng., 44, II, p. 201) and WANGERIN (in Engl., Pflanzenr.) the style is „perbrevis, simplex", whereas HARMS mentions an undivided style among the generic characters. After BENTHAM & HOOKER F., CLARKE, KING and BOERLAGE the style is cylindrical, undivided or shortly bifid.

The present author always found, in female flower buds and in very young female flowers, 4 or 5 petals and 8—10 stamens; in older flowers, however, he found less or none; this suggests that petals and stamens, if originally present, soon fall off in the female flowers (fig. 6). In flower buds, the style appeared to be always bifid, with one branch longer and incurved over the other (fig. 1—2). In open flowers, however, there occurred either styles deeply bifid (fig. 7—10) or such with only one branch (fig. 11—14), or even with no branches at all (fig. 15), but in the latter cases there were scars where the branches apparently were broken off. Though in the cases where only one style branch was present there was often resemblance with the figures of styles given by WANGERIN for *Nyssa ogeche* MARSH. (in ENGL., Pflanzenr., IV, 220a, ic. 1, C, D, E), the present author supposes that all authors describing undivided styles in *Nyssa javanica* have been mislead by styles with the branches broken off.

CRAIB mentions, besides *Nyssa javanica*, a new species called by him *Nyssa bifida* (Kew Bull., 1913, p. 69), for the female flowers of which he does not mention stamens, whereas the style is described as „1.5 mm altus, ramis stylo subaequilongis", and about which in his Florae Siamensis Enumeratio he says: „The markedly bifid styles afford a ready distinguishing mark for this species". As CRAIB's description hardly differs from our specimens it seems most probable that this botanist may have distinguished specimens with style branches broken off as *Nyssa javanica*, and specimens with intact style branches as *Nyssa bifida*.

Yet there is variability in the shape of the style. In general the style is rather thickly, nearly 1—2 × as long as thick, and with little curled branches (fig. 1—2, 6—8, 10—15), but in 3 Sumatra specimens (HANSEN 159, BOSCHPR.BB. 8630 & 1969) the style appeared to be slender, 3—6 × as long as thick, and with thin, strongly twisted branches (fig. 9). The characters, however, of the other parts of these specimens did not allow the distinction of a separate species or variety.

BRANDIS (Indian trees) describes the inflorescences as dense globose pedunculate heads, „these in short axillary pubescent panicles, often solitary near the ends of the branches", and in fig. 149 he gives a flowering twig bearing in one axil 2 pedunculate heads, in another a dichotomous peduncle bearing 2 heads. Among the materials examined by the author there was no specimen at all with any branched inflorescence, but always one pedunculate head in each axil.

The fruit of *Nyssa javanica* is often deformed to a gall. On specimens bearing such fruit Blume based his *Ceratostachys arborea,* transferred into *Nyssa* by Koorders under the name *Nyssa arborea.* For the rest the oldest name for our species is *Agathisanthes javanica,* the oldest name in the genus *Nyssa* is *Nyssa sessiliflora.* Kurz first described the species, wrongly, in the genus *Ilex,* and later transferred it into the new genus *Daphniphyllopsis.* Wangerin was the first to form the combination necessary according to the modern rules of nomenclature.

Malay Peninsula. Perak: Gunong Batu Puteh, 1020 m el., Wray 422 (BD, ♀); Wray 1617 (B, S, ♀); Pahang: Fraser Hill, 1200 m el., Henderson & Nur 11169 (S, ♀) and Herb. Fed. Mal. St. Mus. 11465 coll. Henderson (B, ♀).

Sumatra. Karo-plateau, Lau Boeloeh, 100 m el., Boschpr.bb. 11970 (B, o), v.n.: *kalimbangbang*; Tongkoh, 1500 m el., Boschpr.bb. 6827 (B, o), v.n.: *boenga sempah*; Teungkeh, 1400 m el., Hansen 159 (B, L, ♂, ♀), v.n.:*djamboe-djamboe*; near Laut Kawar, 1500 m el., Boschpr.bb. 8630 (B, L, ♀), v.n.: *sangketan benang*; Toba-plateau, near Pandoemaän, 900 m el., Boschpr.bb. 5694 (B, L, ♀), v.n.: *modang sangkotan,* fruit yellow, with sweet odour and bitter taste; Kampoeng Hoeloe-air near Pajakoemboeh, 1000 m el., Boschpr. S. W. K. III. 20 (B, ♂), and Boschpr.bb. 6708 (B, ♂), v.n.: *madang toei*; Doesoen Moeara Padang near Pajakoemboeh, Kampoeng Si Baladoeng, 1540 m el., Boschpr.bb. 6490 (B, L, ♀); Bengkoeloe-Lebong, Doesoen Tandjoeng Ratoe Talang meranti djedjar, 800 m el., Boschpr.bb. 1969 (B, ♀), v.n.: *medang sepat*; *ibidem,* Boschpr.bb. 1970 (B, o), v.n.: *medarah*; near Doesoen Kotadonok, 600 m el., Boschpr.bb. 2023 (B, ♀); Redjang, Kepahiang, alt. 650 m, Boschpr.bb. 15938 (B), v.n.: *medang tai kambing;* Bengkoeloe-Kroë, near Doesoen Kotabesi, 900 m el., Boschpr.bb. 4098 (B, o), v.n.: *talas tjalih*; Kota Bonglai, Boschpr.bb. 10303 (B, o), v.n.: *talas sowa-ba*; *ibidem,* Boschpr.bb. 10307 (B, o), v.n.: *patjar kidang*; Palembang, Moelak Hoeloe, 800 m el., Grashoff 359 (B, o), v.n.: *medang drian idjang,* tree 40 m high with trunk up to 1 m thick, and with buttresses nearly 1.5 m high; Pasemahlanden, Pg. Oebar, 1000 m el., Boschpr. T. B. 215 (B, L, o), v.n.: *medang bambang koening*; Airangat, foot of Goenoeng Kaba, 600 m el., Forbes 2880 (L, ♀), v.n.: *rawe-rawe.*

Borneo. East-Borneo, Long Petah, 700 m el., Endert 3179 (B, ♂), tree 30 m high, 1 m thick.

Java. Without exact locality: Blume s.n. (B, BD, L, U) at least party originals of *Agathisanthes javanica* Bl., and of *Ceratostachys arborea* Bl.; Banten, Poelasari, Van Hasselt (L, ♀), v.n.: *hoeroe rebing*; Goenoeng Karang, near Poelasari, 1050 m el., Koorders 1325 β (B, o), and 1075 m el., Koorders 1326 β (B, L, ♀), v.n.: *heroeng*; Goenoeng Tjisalak, Pasirtengah, Arsin 19536 H.B. (B, o), v.n.: *hiroeng*; G. Salak, Blume s.n. (L, ♀), originals of *Agathisanthes javanica* Bl., v.n.: *hirung*; G. Salak, Koorders 24162 β (B, ♀), v.n.: *hiroeng* (N.B., the same number is enumerated for Tjibodas in Koorders, Fl. Tjib., 2, p. 235); G. Salak, near Kampoeng Bobodjong, 650 m el., Koorders forest no. 147*, herb. no. 24170β (B, L, ♀), v.n.: *hiroeng*; Parakansalak, and G. Endoet, Warburg 3289 (BD, o), v.n.: *kihiroeng*; G. Gedé, forest Kebonpodjok, 1200 m el., tree no. 12, Uhl 5811a (B, L, ♀), v.n.: *kiroeng*; from the same tree Los 5811a (B, ♀), Kramer 5811a (B, ♀); *ibidem*, tree 19, Kramer 5811 (B, ♂); Tjibodas, coll.? 1318β (L, o); Pasir Kramat, Kp. Tendjolaja Tjisaät near Soekaboemi, Uhl 6591 (B, ♀), fruit dark-wine-red, v.n.: *kiroeng*; Takokak, 1050 m el., Koorders 1317β (B, ♀); forest no. 2037a, with herb. no. 1311β (B, o), 1312β (B, o), 11919β (B, ♀), 25651β (B, L, o), 32796β (B, o), v.n.: *hiroeng*; forest no. 2042a, with herb. no. 1313β (B, ♀), 1314β (B, BD, L, ♀), 1315β (B, BD, L, ♀), 1316β (B, o), 11920β (B, o), 15323β (B, o), 25818β (B, o), 32800β (B, o); forest no. 2362a, with herb. no. 15322β (B, ♀), 32694β (B, o); forest no. 2372a, with herb. no. 15203β (B, L, ♂); forest no. 2380a, with herb. no. 32722β (B, o); forest no. 2396a, with herb. no. 15359β (B, L, ♀), 15759β (B, L, ♀), 25668β (B, ♀); forest no. IIw, with herb. no. 1321β (B, ♀), 1322β (B, ♀), v.n.: *hiroeng*; Tjigenteng, Koorders forest no. 2167a, with herb. no. 4529β (B, o), 9895β (B, o), 24499β (B, ♂), v.n.: *kihonjè*; forest no. IIw, herb. no. 1320β (B, L, o); Kampoeng Tjigoeloedoeg, near Bandoeng, 1050 m el., Boschpr. Ja. 1498 (B, o), v.n.: *hiroeng*; G. Papandajan, Korthals s.n. (L, ♂); G. Slamet, forest Bentjana (Tegal), Koorders 1323β (B, o); G. Prahoe, above Soerdjo, Koorders 1329β (B, o), 11250β (B, o); G. Telamaja, Koorders forest no. 682, with herb. no. 27701β (B, ♀), v.n.: *sengi*; forest no. 2228i, with herb. no. 9967β (B, L, o), forest no. 2247i, with herb. no. 9969β (B, o), v.n.: *wijoeng*; forest no. 2290i, with herb. no. 9968β (B, L, o), v.n.: *serid*; forest no. 2409i, herb. no. 9971β (B, L, ♀); forest no. 2242i, with herb. no. 9973β (B, L, o); 1300 m el., for. no. 2470, herb. no. 35789β (B, L, ♀); Koedoes, near Desa Ternadi, 800 m el., Boschpr. Ja. 1804 (B, o), v.n.: *gedangan*; G. Kawi, Sengon, Warburg 3973 & 3977 (BD, ♂), v.n.: *bedali*; G. Argapoera, N.W. slope, 1200 m el., Backer 13121 bis (B, ♂); G. Idjen, forest Pandjoes, 1000 m el., Koorders 14386β (B, L, ♀); forest no. 3487, herb. no. 32464β (B, L, ♀); Ragadjampi, Koorders 10085β (B, o), v.n.: *tandjang goenoeng*.

Moreover cultivated in the Buitenzorg Botanic Garden under VII. F. 1 (B, L, ♀); seedlings cultivated at Tjiomas, near Buitenzorg, from a specimen from Tendjolaja, Tjisaät, Soekaboemi, are in the seedling herbarium of the Boschproefstation under no. 2993 (B); idem, from a specimen from Kebon Podjok, Soekaboemi, sub no. 1862 (B).

Species reicienda.

Nyssa Hollrungii K. Schumann, in Schum. & Lauterb., Nachtr. Fl. deutsch. Schutzgeb. Südsee, p. 334 (1905) = **Alangium javanicum** (Bl.) Wangerin var. **papuanum** (Melch. & Mansf.) Bloembergen, in Blumea, 1, p. 284 (1935).